Course specifications of

Mathematics (1) - PHM 011

University: Ain Shams **Faculty: Engineering**

Programme on which the course is given	All 12 Engineering Programs
Major or minor element of programme	N.A.
Department offering the programme	All 12 Departments of the faculty
Department offering the course :	Engineering Physics and Mathematics
Academic year/ Level :	
Date of specification approval :	

A- Basic Information

Title :	Mathematics (1)	**code :**	PHM-011
Credit Hours	N.A.	**Lecture :**	4
Tutorial :	2	**Practical**	0 **Total:6**

B- Professional Information

1 – Overall aims of course

This course aims to:

- Evaluate and apply definite integrals to find area, volume of revolution, arc length and surface area.
- Differentiate and integrate algebraic and trigonometric function.
- Identify and deal with all conic sections.
- Deal, differentiate and integrate all transcendental functions.
- Distinguish and apply all different techniques of integration.
- Apply derivatives to find the extreme values of functions and to sketch their graphs.
- Summarize and deal with lines, planes and surfaces in the space.
- Evaluate and apply integrals in parametric and polar coordinates.
- Solve algebraic equations to find their roots and explain the methods for finding them exactly or numerically.
- State and use the mean value theorems and L'Hopital's rule.
- Test different kinds of series for convergence and divergence.
- Define determinants and matrices, and operations related to them, and hence use them to understand the concepts of eigenvalues and eigenvectors.

2- Intended learning outcomes of course (ILOs)

By completing this course successfully, the student will be able to

a-Knowledge and understanding

a1 – List the basic rules of differentiation and define how to find the derivatives of algebraic, trigonometric functions.

- a2 - Define and outline extrema, points of inflection, asymptotes and curve sketching.
- a3 - Define and state Integrals of some algebraic and trigonometric functions, and List the integration rules.
- a4 - Define the exponential and logarithmic functions and their derivatives and outline how to integrate them.
- a5 - Identify and distinguish between conic sections: parabola, ellipse, and hyperbola.
- a6 - List some basic definitions of vectors and operations done on them. Describe planes, lines and surfaces in space.
- a7 - Name and identify inverse trigonometric and hyperbolic functions.
- a8 - Define L'Hopital's rule.
- a9 - Know different techniques of integration and rewrite them in parametric and polar coordinates.

b-Intellectual skills

- b1 - Select appropriate integration method of integrations to solve applied problems.
- b2 - Break down a complicated problem into many simpler steps.
- b3 - Solve problems of intermediate algebra.

c-Professional and practical skills

- c1 - Fix the knowledge of mathematics to solve engineering problems.
- c2 - Relate computational facilities and techniques to analyze and interpret results.

d-General and transferable skills

- d1 - Work in stressful environment.
- d2 - Search for information.

3- Contents

No	Course Content	Class tutorials	Lectures	Total
1	Derivatives and techniques of differentiation.	1	3	4
2	Derivatives of trigonometric functions.	1	3	4
3	Chain rule, implicit, parametric differentiation.	1	4	5
4	Extrema, points of inflection, asymptotes and curve sketching.	2	6	8
5	Linear approximations and differentials.	1	2	3
6	Indefinite integral and change of variables.	1	4	5
7	Definite integral and its applications to area, volumes, arc length and surface area.	4	8	12
8	Logarithmic and exponential functions: properties, derivatives and integrals.	4	6	10
9	Conic sections: parabola, ellipse, and hyperbola.	7	14	21
10	Planes, lines and surfaces in space.	6	12	18
11	Inverse trigonometric and hyperbolic function: properties, graphs, derivatives and integrals.	4	8	12
12	Indeterminate forms and L'Hopital's rule.	1	4	3
13	Techniques of integration: by parts, trigonometric integrals, trigonometric substitutions, by reduction, etc.	6	12	18
14	Integration and its applications in parametric and polar coordinates.	4	6	10
15	Theory of equations.	6	8	14
16	Linear algebra.	5	10	15
17	Series.	6	8	14
	Total Hours	60	120	180

Course content distributed over 15 weeks

Course Coordinator: Prof. Dr. Niveen M. Badra

Head of Department: Prof. Dr. Wael Fekry

Date: / /

4- Assessment schedule

Assessment method	No	Description	Week No	Weight (%)
Assignments and Quiz	12	Assignment1-term2	Week 3	1
Assignments and Quiz	1	Assignment1-term1	Week 3	1
Assignments and Quiz	13	Assignment2-term2	Week 4	1
Assignments and Quiz	3	Assignment2-term1	Week 5	1
Assignments and Quiz	15	Quiz1-term2	Week 6	2
Assignments and Quiz	4	Quiz1-term1	Week 6	2
Assignments and Quiz	16	Assignment3-term2	Week 7	1
Assignments and Quiz	6	Assignment3-term1	Week 8	1
Written Exam	3	Mid Term Exam-term2	Week 9	6
Written Exam	1	Mid Term Exam-term1	Week 9	6
Assignments and Quiz	18	Assignment4-term2	Week 10	1
Assignments and Quiz	8	Assignment4-term1	Week 11	1
Assignments and Quiz	20	Assignment5-term2	Week 12	1
Assignments and Quiz	10	Assignment5-term1	Week 13	1
Written Exam	4	Final Term Exam-term2	Week 15	37
Written Exam	2	Final Term Exam-term1	Week 15	37
Total				100 %

Course Coordinator: Prof. Dr. Niveen M. Badra
Head of Department: Prof. Dr. Wael Fekry
Date: / /

5- List of references

5. 1 Course notes

-Math Staff memebers, "Engineering Mathematics (1) Part A"

-Math Staff memebers, "Engineering Mathematics (1) Part B"

5. 2 Essential books (text books)

-E.W. Swokowski, M. Olinick and others, "Calculus", PWS Publl. Co., Eighth Ed., 2002 or any subsequent edition.

- J.Stewart, "Single Variable Calculus", Brooks/Cole Publ. Co., Eighth Ed., 2015 or any subsequent edition.

6- Facilities required for teaching and learning

- Appropriate teaching class accommodations including presentation board and data show.

Course Coordinator: Prof. Dr. Niveen M. Badra

Head of Department: Prof. Dr. Wael Fekry

Date: / /

Course Content/ILO Matrix

Course Content	a1	a2	a3	a4	a5	a6	a7	a8	a9	b1	b2	b3	c1	c2	d1	d2
Derivatives and techniques of Differentiation.	●	●		●			●						●	●	●	●
Derivatives of trigonometric Functions.	●										●		●	●	●	●
Chain rule, implicit,parametric differentiation.	●														●	
Extrema, points of inflection, asymptotes and curve sketching.	●	●											●	●		●
Linear approximations and differentials.	●											●				
Indefinite integral and change of variables.			●							●					●	
Definite integral and its applications to area,volumes, arc length and surface area.			●							●					●	
Logarithmic and exponential functions:properties, derivatives and integrals.	●		●	●												
Conic sections:parabola, ellipse, and hyperbola.					●									●		
Planes, lines and surfaces in space.						●			●					●	●	
Inverse trigonometric and hyperbolic function: properties, graphs, derivatives and integrals.	●		●				●									
Indeterminate forms and L'Hopital's rule.	●							●				●				
Techniques of integration: by parts,trigonometric integrals, Trigonometric substitutions, by reduction, etc.	●		●							●						

Course Coordinator: Prof. Dr. Niveen M. Badra

Head of Department: Prof. Dr. Wael Fekry

Date: / /

Course Content/ILO Matrix

Course Content	a1	a2	a3	a4	a5	a6	a7	a8	a9	b1	b2	b3	c1	c2	d1	d2
Integration and its applications in parametric and polar coordinates.			●						●	●				●		
Theory of equations.		●		●				●			●	●				●
Linear algebra.					●		●				●	●	●			
Series.						●								●	●	

Learning Method /ILO Matrix

Learning Method	a1	a2	a3	a4	a5	a6	a7	a8	a9	b1	b2	b3	c1	c2	d1	d2
Lectures				●	●						●	●	●		●	
Class tutorials	●	●	●	●		●	●	●	●	●			●	●		●

Course Coordinator: Prof. Dr. Niveen M. Badra

Head of Department: Prof. Dr. Wael Fekry

Date: / /

Assessment Methods /ILO Matrix

Assessment	a1	a2	a3	a4	a5	a6	a7	a8	a9	b1	b2	b3	c1	c2
Assignments and Quiz : Assignment1-term1		●					●							
Assignments and Quiz : Assignment1-term2	●													
Assignments and Quiz : Assignment2-term1								●						
Assignments and Quiz : Assignment2-term2			●		●									
Assignments and Quiz : Quiz1-term1	●	●	●		●					●		●		●
Assignments and Quiz : Quiz1-term2							●	●						
Assignments and Quiz : Assignment3-term1									●					
Assignments and Quiz : Assignment3-term2			●		●									
Written Exam : Mid Term Exam-term1							●	●	●					
Written Exam : Mid Term Exam-term2	●	●	●		●									
Assignments and Quiz : Assignment4-term1									●					
Assignments and Quiz : Assignment4-term2				●	●									
Assignments and Quiz : Assignment5-term1									●					
Assignments and Quiz : Assignment5-term2				●		●								
Written Exam : Final Term Exam-term1							●	●	●	●	●	●		
Written Exam : Final Term Exam-term2	●	●	●	●	●	●				●	●	●		

Course Coordinator: Prof. Dr. Neveen M. Badra

Head of Department: Prof. Dr. Neveen M. Badra

Date: / /

Course specifications of

Physics (1) – PHM 021

University: Ain Shams **Faculty: Engineering**

Programme on which the course is given:	All 13 Engineering programs.
Major or minor element of programme :	N.A.
Department offering the programme :	All Engineering Departments.
Department offering the course:	Engineering Physics & Mathematics.
Academic year/ Level:	.
Date of specification approval:	

A- Basic Information

Title:	Physics (1)	**Code:**	PHM 021
Credit Hours:	**N.A.**	**Lecture:**	4
Tutorial :	1	**Practical:**	1
Total:	6		

B- Professional Information

1- Overall aims of course

By the end of the course, the students will be able to:

- Know the unit and deduce the dimension of any physical quantity. Understanding the difference between scalar and vector quantities and the mathematical laws governing them.
- Know and understand the physical meaning of different physical quantities.
- Analyze and solve problems based on understanding of physical concepts and laws.
- Precisely measure different physical quantities and evaluate other quantities using the data measured.
- Know some engineering applications based on the studied physical concepts and understand their principle of action.
- Understand, appreciate, and use the scientific process that scientists use to deduce physical laws.
- Appreciate the power of science in understanding, developing and sustaining life.

2- Intended learning outcomes of course (ILOs)

a. Knowledge and understanding

a1- Distinguish between the units and dimensions of physical quantities.
a2- Differentiate between the linear motion and the circular motion and know the law of conservation of energy.
a3- Define the laws of elasticity, and the physical identification of fluids.
a4- Identify the effect of electric field on a moving charge and the meaning of potential difference.
a5- Define the DC-current, Ohm's law, Capacitance in the presence of dielectric materials,

a6- Know the concepts of induced emf, inductors, magnetic field, and AC-current.
a7- Understand the first & the second laws of thermodynamics and Heat transfer. Also the laws of mirrors and lenses.

b. Intellectual skills

b1- Convert between different physical units and identifying the dimension.
b2- Use scientific process to analyze and solve problems.
b3- Know how to understand different physical phenomena.
b4- Apply different physical theories.

c. Professional and practical skills

c1. Be able how to measure different physical quantities.
c2. Validate physical laws experimentally..
c3. Design simple systems, setups or circuits to achieve a required performance.

d. General and transferable skills

d1- Search for information and engage in life-long self learning discipline.
d2- Manage effectively tasks, time and resources.
d3- Collaborate effectively within multidiscipline team.

3- Contents

No	Course Content	Exercise classes	Laboratory experiments	Lecture classes	Total
1	Units and dimensions	1	0	4	5
2	Linear and circular motion and conservation of motion.	2	0	8	10
3	Stress-Strain relationship, Young's modulus of solids and modulus of rigidity, bulk modulus.	4	4	8	16
4	Fluid statics, pressure, Pascal's law, surface tension, capillary tubes.	4	2	8	14
5	Fluid dynamics, viscosity, Bernoulli's equation, Venture meter, Pitot tube, Reynolds's number.	4	2	8	14
6	Coulomb's law, types of charges, electric field and Electric field due many charges, Gauss' law, electric potential, relation between electric field and electric potential.	4	0	8	12

Course Coordinator: Prof. Dr. Salah Gamal.

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Date: 25 / 3 / 2012

7	Definition of dc-current, Ohm's law. Kirchhoff's laws for circuits, insulators conductors, capacitors.	**4**	**2**	**8**	**14**
8	Effect of magnetic field on moving charges, and current, Ampere's law, induced emf, inductors.	**4**	**2**	**8**	**14**
9	Magnetic force between two parallel currents, toroids, solenoids, growth and decay of current in inductors.	**4**	**2**	**8**	**14**
10	AC-current, root mean square of current, phase diagram of different circuits, resonance.	**4**	**0**	**6**	**10**
11	Heat transfer, kinetic theory of gases, First law of thermodynamics and second law of thermodynamics.	**4**	**2**	**8**	**14**
12	Geometrical optics, Snell's law, Chromatic dispersion, laws of curved mirrors. Hygen's principle, total internal reflections, the law of convex and concave lenses.	**4**	**2**	**8**	**14**
	Total	**40**	**20**	**90**	**150**

4- Assessment schedule

Assessment method	**No**	**Description**	**Week No**	**Weight (%)**
Reports	1	Experiment's report first term	8	2
Report	1	Experiment's report second term	8	2
Written tests	2	Quiz first term	10	2
Written tests	5	Quiz second term	10	2
Written tests	1	Mid-term first term	8	6
Written tests	4	Mid-term second term	8	6
Practical exam.	1	Oral and experiment making second term.	11	20
Written tests	3	Final first term exam	16	30
Written tests	6	Final second term exam	16	30
Total				100 %

Course Coordinator: Prof. Dr. Salah Gamal.

Head of Department: Prof. Dr. Nevin Badra.

Date: 25 / 3 / 2012

5- List of references

a. Course notes

-Prof. Dr. Omar A. Omar, “Electricity” and Dr. Samy AbdelRahman, “Properties of Matter”.

- Prof. Dr. Omar A. Omar, “Thermodynamics and Geometrical Optics” and Dr. Samy AbdelRahman, “Electromagnetism”.

b. Essential books (text books)

- - Physics for Scientists and Engineers with Modern Physics, by R.A. Serway and J. W. Jewett, 8^{th}Ed. (2010). Published by Brooks-Cole.

- Fundamentals of Physics, by D. Halliday and R, Resnick,John Wiley, 7^{th} d.(2007).

Facilities required for teaching and learning

- Appropriate teaching class accommodations
- Presentation board
- Data-Shows in lectures

Course Content/ILO Matrix

Course Content	a1	a2	a3	a4	a5	a6	a7	b1	b2	b3	b4	c1	c2	c3	d1	d2	d3
Units and dimensions	⊗				⊗							⊗			⊗		
Linear and circular motion and conservation of motion.		⊗				⊗			⊗				⊗			⊗	
Stress-Strain relationship, Young’s modulus of solids and modulus of rigidity, bulk modulus.			⊗		⊗		⊗	⊗		⊗				⊗			⊗
Fluid statics, pressure ,Pascal's law, surface tension, capillary tubes.		⊗		⊗		⊗			⊗	⊗			⊗		⊗		

Course Coordinator: Prof. Dr. Salah Gamal.

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Date: 25 / 3 / 2012

Fluid dynamics, viscosity, Bernoulli's equation, Venture meter, Pitot tube, Renold's number.		⊗			⊗			⊗		⊗			⊗		⊗		⊗
Coulomb's law, types of charges, electric field and Electric field due many charges, Gauss' law, electric potential, relation between electric field and electric potential.			⊗			⊗			⊗			⊗		⊗	⊗		⊗
Definition of dc-current, Ohm's law. Kirchhoff's laws for circuits, insulators conductors, capacitors.	⊗		⊗		⊗			⊗			⊗			⊗		⊗	⊗
Effect of magnetic field on moving charges, and current, Ampere's law, induced emf, inductors.		⊗		⊗			⊗			⊗			⊗			⊗	
Magnetic force between two parallel currents, toroids, solenoids, growth and decay of current in inductors.			⊗		⊗			⊗			⊗			⊗			⊗
AC-current, root mean square of current, phase	⊗		⊗		⊗			⊗			⊗			⊗			⊗

Course Coordinator: Prof. Dr. Salah Gamal.

Head of Department: Prof. Dr. Nevin Badra.

Date: 25 / 3 / 2012

diagram of different circuits, resonance																	
Heat transfer, kinetic theory of gases, First law of thermodynamics and second law of thermodynamics		⊗		⊗		⊗			⊗			⊗		⊗		⊗	
Geometrical optics, Snell's law, Chromatic dispersion, laws of curved mirrors. Hygen's principle, total internal reflections, the law of convex and concave lenses.			⊗			⊗		⊗			⊗			⊗	⊗		⊗

Learning Method /ILO Matrix

Course Content	a1	a2	a3	a4	a5	a6	a7	b1	b2	b3	b4	c1	c2	c3	d1	d2	d3
Lecture classes	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗
Exercise classes	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗
Laboratory experiments		⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗

Assessment Methods /ILO Matrix

Course Coordinator: Prof. Dr. Salah Gamal.

Head of Department: Prof. Dr. Nevin Badra.

Date: 25 / 3 / 2012

Assessment	a1	a2	a3	a4	a5	a6	a7	b1	b2	b3	b4	c1	c2	c3	d1	d2	d3
Reports	⊗		⊗						⊗	⊗			⊗				
Reports		⊗			⊗			⊗				⊗		⊗			
Quiz first term	⊗		⊗			⊗			⊗				⊗		⊗		
Quiz second term		⊗		⊗				⊗		⊗				⊗		⊗	
Mid-term first term			⊗		⊗		⊗			⊗	⊗			⊗			⊗
Mid-term second term				⊗		⊗			⊗			⊗			⊗		
Oral and experiment making second term.		⊗					⊗						⊗			⊗	
Final first term exam	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗
Final second term exam	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗	⊗

Course Coordinator: Prof. Dr. Salah Gamal.

Head of Department: Prof. Dr. Nevin Badra.

Date: 25 / 3 / 2012

Course specifications of

Engineering Mechanics I (Dynamics) – PHM031

University: Ain Shams **Faculty: Engineering**

Program on which the course is given:	All Engineering Program
Major or minor element of program :	N.A.
Department offering the program :	All Engineering Program
Department Teaching the course:	Physics and Engineering Mathematics
Academic year/ Level:	level 1
Date of specification approval:	

A- Basic Information

Title:	Engineering Mechanics II (Dynamics)	**Code:**	PHM031
Credit Hours:	**3**	**Lecture:**	2
Tutorial :	2	**Practical:**	0
Total:	4		

B- Professional Information

1- Overall aims of course

By the end of the course, students will be able to:

- Recognize the fundamental quantities for describing the kinematics of motion of the particle.
- Study the concept of kinetics which relating the forces and accelerations.
- Perform the analysis of force-acceleration principle for various types of problems that containing particles or rigid bodies.
- Recognize the definition of important fundamental quantities in the field of Dynamics such as work; energy; impulse and momentum.
- Analyze the motion of particles using alternative principles of kinetics such as the work-energy principle and the impulse-momentum principle.

2- Intended learning outcomes of course (ILOs)

a. Knowledge and understanding

a1- Define the fundamental quantities for describing the kinematics of motion of the particle.

a 2- Define the concept of kinetics which relating the forces and accelerations.

a 3- Write equations of motion of a particle

a 4- Define different types of motion.

a 5- Define conservation of momentum of a body.

b. Intellectual skills

b1- Calculate the Velocity and Acceleration of a particle.

b 2- Discriminate between different System of units.

b 3- Find linear momentum of a particle and its rate of change.

b 4- Describe the motion of a particle.

c. Professional and practical skills

c1- Use Kinematics of particles to formulate equations of motions.

c2- Fix the knowledge of Mechanical Motion to solve engineering problems.

d. General and transferable skills

d1- Work effectively in a team.

d2- Develop the skills related to creative thinking, problem solver, and teamwork in different fields.

3- Contents

No	Course Content	Lecture (hours)	Tutorial	Total
1	Kinematics of particles a- Motion in straight line b- Motion about a curve c- Relative Motion	**6**	**4**	**10**
2	Kinetics of Particle Newton's second law of motion.	**6**	**4**	**10**
3	Projectile Motion	**4**	**2**	**6**
4	Work, Energy and momentum.	**4**	**2**	**6**
5	Impact and Impulsive Motion	**4**	**2**	**6**
	Total	**24**	**14**	**38**

4- Assessment schedule

Assessment method	No	Description	Week No	Weight (%)
lab + Attendance		lab +Attendance	6	10
Written Exam		Mid Term	8	20
Written Exam		Final Term Exam	14	70
Total				100 %

5- List of references

Essential books (text books) Mechanics Staff Notes Engineering Dynamics Of Particles.

6- **Recommended books**

Course Coordinator: **Dr. Mohamed Mahmoud Attia**

Programs Director: **Prof. Dr. Wael Fakry**

Date: **5/8/2017** **PHM031**

a- Beer F., Johnston R. and Claysen W., " Vector Mechanics for Engineering ", McGraw Hill, 9th Edition, 2010.(Dynamics)

b- Hibbeler R.., " Engineering Mechanics: Dynamics ", 10th Edition, 2006.
Riley W. and Sturges L.., " Engineering Mechanics: Dynamics ".

b. Periodicals, Web sites, … etc

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7- Facilities required for teaching and learning

- Blackboard in lectures

Course Content/ILO Matrix

Course Content	a1	a2	a3	a4	a5	b1	b2	b3	b4	c1	c2	d1	d2
Kinematics of particles d- Motion in straight line e- Motion about a curve f- Relative Motion	●		●		●	●	●			●		●	
Kinetics of Particle Newton's second law of motion.	●	●		●				●			●		
Projectile Motion			●	●	●	●			●		●		●
Work, Energy and momentum.	●		●	●			●					●	
Impact and Impulsive Motion		●			●			●		●			●

Learning Method /ILO Matrix

Course Content	a1	a2	a3	a4	a5	b1	b2	b3	b4	c1	c2	d1	d2
Lectures	●		●		●	●	●			●		●	
Tutorials	●	●		●				●			●		●

Course Coordinator: **Dr. Mohamed Mahmoud Attia**

Programs Director: **Prof. Dr. Wael Fakry**

Date: **5/8/2017**

Assessment Methods /ILO Matrix

Assessment	a1	a2	a3	a4	a5	b1	b2	b3	b4	c1	c2	d1	d2
Sheets & Assignment	●		●		●	●	●			●		●	
Quiz	●	●		●				●			●		●
Mid Term	●		●		●	●	●			●		●	
Final Term Exam	●	●		●				●			●		●

Course specifications of

General Chemistry – PHM 041

University: Ain Shams **Faculty: Engineering**

Course Specifications

Programme(s) on which the course is given: Freshmen
Major or minor element of program: N.A.
Department offering the course: Engineering Physics and Mathematics.
Academic year / Level: **Freshmen**
Date of specification approval: / /

A- Basic Information

Title: Engineering Chemistry **Code: ECHM 110**
Lecture: 2
Tutorial: 2 **Practical: 2** **Total: 6**

B- Professional Information

1 – Overall aims of course

By the end of this course, the student will be able to:

1) Demonstrate knowledge and the basic concepts of physical chemistry related to the main topics of engineering courses
2) Recognize and formulate the basic concepts of refrigeration of air solid state, the basic concepts of chemical thermodynamics, corrosion control via electrochemical approach, the main concepts of polymer, cement chemistry and the pollution of air and its control.

The student shall attain the above mentioned objectives efficiently under controlled guidance and supervision while gaining the appreciate experience.

2 – Intended learning outcomes of course (ILOs)

a- Knowledge and understanding:

a1 Define the main physical and chemical phenomena and terms related to the above mentioned subjects

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Course Coordinator: Dr Ghada Bassuoni

Unit Head: Prof. Wael fekry

b- Intellectual skills

b1 Suggest different solutions for calculation of numerical problems related to the above mentioned subjects

b2 Relate chemical reactions and their characteristics to process industries

c- Professional and practical skills

c1-Deal with accurate use of different glass wear used for qualitative and quantities chemical analysis.

c2-Gain sufficient idea about physical properties of petroleum oil analysis using standard equipments.

d- General skills

d1 Practice working in a team work.

3- Contents

No	Course Content	Lecture (hours)	Tutorial	Total
1	Gases	2	2	8
2	Liquid state and solids	2	2	8
3	Thermo chemistry + Thermodynamics	2	2	8
4	Solutions	2	2	8
5	Electrochemistry + Corrosion of metals	2	2	8
6	Water treatment + Chemistry of cements	2	1	6
7	Chemistry of polymers	1	1	4
8	Fuels combustion	1	2	6
9	Pollution and its control.	1	1	4
	Total	**15**	**15**	**60**

4– Teaching and learning methods

1- Class Lectures
2- Chemical analysis Laboratory

Course Coordinator: Dr Ghada Bassuoni

Unit Head: Prof. Wael fekry

5- Student assessment methods

1- Written exams (mid-term & final) to assess understanding and scientific knowledge
2- Assignments and Quiz to assess ability to solve problems and analyze results independently
3 -Report to assess practical, and presentation skills
4- Laboratory exam.

Assessment schedule

1) Five assessments every two weeks starting form the second week
2) Two mid. term exams.

Weighting of assessments

Practical exam	20 %
Two midterm exams	20 %
Quizes	10%
Assignments and attendance	10%
Final written exam	40%
Total	100 %

6- List of references

6.1- Text books

1- Petrucci (General Chemistry) 4th Ed. Pearson. (2005)

7- Facilities required for teaching and learning

1- Appropriate teaching class accommodations including presentation board and over head projector.
2- Analytical chemistry laboratory.

Date:

Course Coordinator: Dr Ghada Bassuoni

Unit Head: Prof. Wael fekry

Course Content/ILO Matrix

Course Content	a1	b1	b2	c1	c2	d1
Gases	●	●				
Liquid state and solids	●	●				
Thermo chemistry + Thermodynamics	●	●	●			
Solutions	●	●	●	●	●	●
Electrochemistry + Corrosion of metals	●	●	●	●	●	●
Water treatment + Chemistry of cements	●		●	●		●
Chemistry of polymers	●		●			●
Fuels combustion	●		●		●	
Pollution and its control.	●		●			

Learning Method /ILO Matrix

Learning method	a1	b1	b2	c1	c2	d1
Class Lectures	●	●	●			
Chemical analysis Laboratory			●	●	●	●

Assessment Methods /ILO Matrix

Assessment	a1	b1	b2	c1	c2	d1
Written exams (mid-term & final)	●	●				
Assignments and Quizzes	●	●				
Reports			●			●
Laboratory exam			●	●	●	

Course Coordinator: **Dr Ghada Bassuoni**

Unit Head: **Prof. Wael fekry**

Course Specifications of

Engineering Drawing & Projection - MDP021

University: Ain Shams **Faculty: Engineering**

Programme(s) on which the course is given B. Sc. in Engineering
Major or minor element of programme N.A.
Department offering the programme Design and Production Engineering Department
Department offering the course Design and Production Engineering Department
Academic year / Level
Date of specification approval

A- Basic Information

Title: Engineering drawing & projection **Code: MDP 021** **Credit Hours: N.A.**

Lecture: 2 **Tutorial: 8** **Practical: 0** **Total: 10**

B- Professional Information

1 – Overall aims of course

By the end of this course, the student will be able to:

- Demonstrate knowledge and understanding the fundamental of engineering drawing.
- Demonstrate knowledge and understanding various technical drawings with necessary views and dimensions.
- Enlarge students' imagination capability in understanding the mechanical drawings and steel structure drawing.

The student shall attain the above mentioned objectives efficiently under controlled guidance and supervision while gaining the experience through imagination and drawing any mechanical and steel structure drawing.

2 – Intended learning outcomes of course (ILOs)

a- Knowledge and understanding:

a1- The fundamental of engineering drawings.
a2- The various technical drawings (isometry and necessary views).

b- Intellectual skills

b1- Develop skills in visualizing the various views of mechanical and steel parts.
b2- Create own design ideas expressed in engineering drawings.

c- Professional and practical skills

c1- Define the type drawings and the orthogonal projection.

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c2- Enlarge students' imagination capability in understanding the mechanical drawings and steel structure drawing.

d- General and transferable skills

d1- Drawing any mechanical and steel elements in its three projection views.

d2- Practice working in a team to draw any mechanical and steel elements

3- Contents

No.	Topic	No. of hours	Lecture	Tutorial/Practical
1	Conventional lettering and dimensioning	10	2	8
2	Geometric constructions	10	2	8
3	Theories of view derivation	15	3	12
4	Orthographic projection of engineering bodies	15	3	12
5	Projection of points, lines, surfaces and bodies	20	4	16
6	Derivation of views and sections from given views	20	4	16
7	Intersection of bodies and surfaces	20	4	16
8	Steel construction	20	4	16
9	Computer aided drafting	20	4	16
Total		150	30	120

4- Assessment schedule

Assessment method	No.	Description	Week No.	Weight (%)
Assignment	1	Exercise 1	Week 1	1.3
Assignment	2	Exercise 2	Week 2	1.3
Assignment	3	Exercise 3	Week 3	1.3
Assignment	4	Exercise 4	Week 4	1.3
Assignment	5	Exercise 5	Week 5	1.3
Assignment	6	Exercise 6	Week 6	1.3
Assignment	7	Exercise 7	Week 7	1.3
Assignment	8	Exercise 8	Week 7	1.3
Exam	9	Mid term Exam	Week 9	6.6
Assignment		Exercise 9	Week 10	1.3
Assignment		Exercise 10	Week 11	1.3
Assignment		Exercise 11	Week 12	1.3
Assignment		Exercise 12	Week 13	1.3
Assignment		Exercise 13	Week 14	1.3
Assignment		Exercise 14	Week 15	1.3
Assignment		Exercise 15	Week 16	1.3
Assignment		Exercise 16	Week 18	1.3
Assignment		Exercise 17	Week 20	1.3
Assignment		Exercise 18	Week 22	1.3
Exam		Mid term Exam	Week 24	6.6
Assignment		Exercise 19	Week 26	1.3
Assignment		Exercise 20	Week 28	1.3
Exam		Final Exam	Week 30	60
Total				100%

-

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Head of Department: **Prof. Dr. Hesham Aly Sonbol**

Date: 01-Septemper-2016

5- List of references

5-1 Course notes

- Engineering Drawing not books.

5-2 Essential books (text books)

1- Thomas, E.F., “Fundamentals of Engineering Drawing”, McGraw-Hill, 2004

2-Thomas, E.F. and Vierck, C.J., “Engineering Drawing and Graphic Technology”, McGraw-Hill, 2001

3- Hart, K.R., “Engineering Drawing”, The English Universities Press Ltd, 2003

5.3- Recommended books

1- Dobrovolsky, Machine elements, MIR Publisher Co. 1997.

2- Reshetov, D. N., Machine Design, MIR Publisher Co. 2001

5.4- Periodicals, Web sites, … etc

1- http://www.ces.clemson.edu

2- http://www.prenhall.com/Giesecke

3- http://www.osu.okmulgee.edu

6- Facilities required for teaching and learning

- Appropriate teaching class accommodations including presentation board and data show

Course Content/ILO Matrix

Course Content	a1	a2	b1	b2	c1	c2	d1	d2
Geometric constructions	•							
Theories of view derivation	•	•						
Orthographic projection of engineering bodies	•	•			•		•	•
Projection of points, lines, surfaces and bodies	•	•	•			•		
Derivation of views and sections from given views	•	•	•	•	•	•	•	•
Intersection of bodies and surfaces	•	•	•	•				
Steel construction	•	•	•	•	•	•	•	•
Computer aided drafting	•						•	

Learning Method/ILO Matrix

Course Content	a1	a2	b1	b2	c1	c2	d1	
Class Lectures	•	•	•	•	•	•	•	
Tutorial application	•	•	•	•	•	•	•	•

-

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Head of Department: **Prof. Dr. Hesham Aly Sonbol**

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Assessment Methods / ILO Matrix

Course Content	a1	a1	b1	b2	c1	c2	d1	d2
Assignment 1	•							
Assignment 2	•							
Assignment 3	•	•						
Assignment 4	•	•	•					
Assignment 5	•	•	•					
Assignment 6	•	•	•					
Assignment 7	•	•	•					
Assignment 8	•	•	•	•				
Exam 1	•		•	•				
Assignment 9	•	•	•	•	•	•		
Assignment 10	•	•	•	•	•	•	•	•
Assignment 11	•	•	•	•	•	•	•	•
Assignment 12	•	•	•	•	•	•	•	•
Assignment 13	•	•	•		•	•	•	•
Assignment 14	•	•	•		•	•	•	•
Assignment 15	•	•	•	•	•	•	•	•
Assignment 16	•	•	•	•	•	•	•	•
Assignment 17	•	•	•	•	•	•	•	•
Assignment 18	•	•	•	•	•	•	•	•
Exam 2	•	•	•		•	•	•	
Assignment 19	•	•	•	•	•	•	•	•
Assignment 20	•	•	•	•	•	•	•	•
Final Exam	•	•	•	•	•	•	•	

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Head of Department: **Prof. Dr. Hesham Aly Sonbol**
Date: 01-Septemper-2016

Course specifications of

Production Technology & Engineering History - MDP 022

University: Ain Shams **Faculty: Engineering**

Program on which the course is given	All Engineering Programs
Major or minor element of program	N.A.
Department offering the program	All Engineering Departments
Department offering the course:	Design and Production Engineering
Academic year/ Level:	Preparatory year
Date of specification approval :	

A- Basic Information

Title :	Production Technology & Engineering History	**code :**	MDP-022		
Credit Hours :	N.A.	**Lecture :**	4		
Tutorial :	1	**Practical**	2	**Total:**	7

B- Professional Information

1 – Overall aims of course

By the end of the course the students will be able to:

- Demonstrate knowledge and understanding of different manufacturing processes
- Evaluate the applicability of particular materials for specific design requirements
- Select appropriate manufacturing process to produce various products
- Evaluate the economics of manufacturing processes selected for particular products
- Demonstrate knowledge of role of engineering in development and establishment of civilization
- Demonstrate knowledge and understanding of engineering history in ancient time, middle ages and modern time
- Demonstrate knowledge and understanding of technology transfer, environmental, inventions and engineering ethics

2- Intended learning outcomes of course (ILOs)

a-Knowledge and understanding

a1 - Explain the different manufacturing processes; concept, advantages, disadvantages and capabilities

a2 - Identify the different factors affecting product economic

a3 - State the element of product cost.

a4 - State the role of engineering in development and establishment of civilization

a5 - Identify technology transfer, environmental, inventions and engineering ethics

Course Coordinator: Prof. Dr. Monir Mohamed Farid Koura

Head of Department: Prof.Dr. Hesham Senbel

Date: / /

b-Intellectual skills

- b1 - Assign a proper material to a certain product
- b2 - Suggest a suitable manufacturing process to produce certain product
- b3 - Suggest alternative solutions according to different given constrains
- b4 - Assess engineering history in ancient, middle and modern time.
- b5 - Assess resources in engineering history

c-Professional and practical skills

- c1 - Identify each manufacturing processes type
- c2 - Use safely and accurately simple measuring tools
- c3 - Analyze the product cost factors
- c4 - Deal with engineering history at various times
- c5 - Analyze methods and tools used in engineering history and engineering ethics

d-General and transferable skills

- d1 - Present the technical report in oral seminar
- d2 - Present the manufacturing processes in a written reports
- d3 - Work as a part of a team in discussion group for a real case study
- d4 - Present engineering ethics by technical report and presentation

3- Contents

No	Course Content	Class Lecture	Tutorials	Workshop lap	Total
1	Engineering material; properties and selection	4		2	6
2	Casting and joining of metals	4		6	10
3	Basic forming processes	6		6	12
4	Polymers forming	2		2	4
5	Machining fundamentals	4		4	8
6	Machining processes	4		4	8
7	Economics of manufacturing processes	2		2	4
8	Standardization and quality control	4		2	6
9	Maintenance systems	2	1	2	5
10	Introduction to art, science and engineering	2	1		3
11	History of Engineering in ancient time, middle age and modern time	8	4		12
12	Methods and tools used in different era	8	4		12
13	Methodology technology transfer & its gap	4	2		6
14	Environmental issues	2	1		3
15	Innovations	2	1		3
16	Engineering Ethics	2	1		3
Total Hours		60	15	30	105

Course Coordinator: Prof. Dr. Monir Mohamed Farid Koura

Head of Department: Prof.Dr. Hesham Senbel

Date: / /

4- Assessment schedule

Assessment method	No	Description	Week No	Weight
Assignment		Ass1	Week 2	2
Report		Report 1	Week 3	5
Report		Report 2	Week 4	5
Written Exam		Quiz 1	Week 5	3
Assignment		Ass2	Week 6	2
Written Exam		Mid-term exam	Week 8	5
Assignment		Ass3	Week 9	2
Report		Report 3	Week 10	5
Report		Report 4	Week 11	5
Quiz		Quiz 2	Week 12	4
Assignment		Ass4	Week 13	2
Oral Exam		Oral Exam	Week 14	35
Written Exam		Final Exam	Week 16	100
Total				175

5- List of references

5. 1 Course notes

- Koura M., Bardisi M, Awad M.; Production Technology, El hakeem press, 2006
- Chaaban, M. A., "History of Engineering and technology", Elslam Press, 1998

5. 2 Essential books (text books)

- Kalpakjian, Manufacturing Engineering and Technology, Addison-Wesley Publishing Company, 1995
- Fred Waters, Fundamentals of Manufacturing for Engineers, Taylor & Francis
- Singer, C. Holmyard, E. J. and Hill, A. R., History of Technology, Oxford university press, London, 1975

6- Facilities required for teaching and learning

- Appropriate teaching class accommodations including; data show, presentation board and white board
- Workshop lab equipped with different manufacturing processes

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Head of Department: Prof.Dr. Hesham Senbel

Date: / /

Course Content/ILO Matrix

Course Content	a1	a2	a3	a4	a5	b1	b2	b3	b4	b5	c1	c2	c3	c4	c5	d1	d2	d3	d4
Engineering material; properties and selection		●				●					●					●			
Casting and joining of metals	●						●				●						●		
Basic forming processes	●						●	●			●						●		
Polymers forming	●						●				●					●			
Machining fundamentals	●															●			
Machining processes	●		●				●	●			●		●				●		
Economics of manufacturing processes			●										●						
Standardization and quality control		●						●				●						●	
Maintenance systems		●																	
Introduction to art, science and engineering				●															
History of Engineering in ancient time, middle age and modern time				●					●					●					
Methods and tools used in different era				●					●						●	●			
Methodology technology transfer & its gap				●					●					●					
Environmental issues					●					●								●	
Innovations					●					●					●				
Engineering Ethics					●					●					●				●

Learning Method /ILO Matrix

Learning Method	a1	a2	a3	a4	a5	b1	b2	b3	b4	b5	c1	c2	c3	c4	c5	d1	d2	d3	d4
Class Lecture	●	●	●		●	●		●	●	●	●			●	●				
Tutorials				●	●				●	●			●	●	●			●	●
Workshop Lab	●	●	●			●	●	●			●					●	●		
Educational CD	●						●	●			●					●	●		
Internet Search		●			●	●		●		●	●	●			●	●		●	

Course Coordinator: Prof. Dr. Monir Mohamed Farid Koura

Head of Department: Prof.Dr. Hesham Senbel

Date: / /

Assessment Methods /ILO Matrix

Assessment	a1	a2	a3	a4	a5	b1	b2	b3	b4	b5	c1	c2	c3	c4	c5	d1	d2	d3	d4
Assignment : Ass1	●										●								
Report : Report 1	●										●	●							●
Report : Report 2		●										●					●		
Written Exam : Quiz 1	●	●				●	●				●	●							
Assignment : Ass2		●											●						
Written Exam : Mid term exam	●	●	●								●	●	●						
Assignment : Ass3			●											●					
Report : Report 3				●										●					●
Report : Report 4					●										●		●		
Quiz : Quiz 2				●	●			●	●					●	●				
Assignment : Ass4				●	●					●					●				
Oral Exam : Oral Exam											●	●				●		●	
Written Exam : Final Exam	●	●	●	●	●	●	●	●	●	●			●	●	●				

Course Coordinator: Prof. Dr. Monir Mohamed Farid Koura

Head of Department: Prof.Dr. Hesham Senbel

Date: / /

Course specifications of

Computer Technology - CSE 011

University: Ain Shams **Faculty: Engineering**

Programme on which the course is given	All Programs
Major or minor element of programme	N.A.
Department offering the programme	All Departments
Department offering the course :	Computer and Systems Engineering
Academic year/ Level :	0th Year / 1st Level
Date of specification approval :	

A- Basic Information

Title :	Computer Technology	**code :**	CSE-011		
Credit Hours	N.A.	**Lecture :**	2		
Tutorial :	1	**Practical**	0	**Total:**	3

B- Professional Information

1 – Overall aims of course

This course aims to:

- Provide students with basic knowledge about the structure of the computer
- Train students to write programs in C programming language
- Develop the student's basic skills of using computers and networks

2- Intended learning outcomes of course (ILOs)

By completing this course successfully, the student will be able to:

a-Knowledge and understanding

a1 - Identify the components of a computer system and its architecture
a2 - Define programming, programs
a3 - Define operating systems and file managements
a4 - Define network and multimedia components

b-Intellectual skills

b1 - Convert between numbering systems
b2 - Write detailed C programs and draw flow charts for them
b3 - Draw layouts for memory and file allocation
b4 - Calculate the time of file transfer

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Head of Department: Prof. Ashraf Salem
Date: / /

c-Professional and practical skills

c1 - Search the Internet

c2 - Use the file system commands

Course Coordinator: Prof. Hani Kamal Mahdi

Head of Department: Prof. Ashraf Salem

Date: / /

d-General and transferable skills

d1 - Write a report
d2 - Use the email system
d3 - Use digital libraries and/or eLearning systems

3- Contents

No	Course Content	Lecture	Tutorial	Total
1	The components of a computer system	2	1	3
2	Data representation	4	2	6
3	Flowcharts	2	1	3
4	Introduction to programming	2	1	3
5	Controlling program flow	2	1	3
6	Advanced data types	2	1	3
7	Functions	2	1	3
8	Solving engineering problems	2	2	4
9	Components of an operating system	2	1	3
10	Process management	2	1	3
11	Memory management	2		2
12	File system	2	1	3
13	Computer networks	2	1	3
14	Multimedia systems	2	1	3
	Total Hours	30	15	45

4- Assessment schedule

Assessment method	No	Description	Week No	Weight (%)
Labs	1	Assess practical skills and attitudes	Week 5	13
Midterm examination	2	Assess knowledge of course material	Week 10	20
Final term examination	3	Assess problem solving and intellectual skills	Week 16	67
Total				100 %

Course Coordinator: Prof. Hani Kamal Mahdi
Head of Department: Prof. Ashraf Salem
Date: / /

5- List of references

5. 1 Course notes

- Developed by course instructors and reviewed by course coordinator

5. 2 Essential books (text books)

- ---- ---- ----

5. 3 Recommended books

- ---- ---- ----

5. 4 Periodicals, Web sites, … etc

- ---- ---- ----

6- Facilities required for teaching and learning

- Blackboard in lectures, labs, tutorials
- Computers for students in the labs
- Overhead Projectors in lectures
- Data-Shows in lectures
- Related software

Course Content/ILO Matrix

Course Content	a1	a2	a3	a4	b1	b2	b3	b4	c1	c2	d1	d2	d3
The components of a computer system	•												
Data representation					•								
Flowcharts		•				•							
Introduction to programming		•				•							
Functions		•									•		
Solving engineering problems					•	•			•				
Components of an operating system			•					•		•			
Process management													•
Memory management							•						
File system			•				•	•		•			
Computer networks	•			•					•		•	•	•
Multimedia systems				•							•	•	•

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Head of Department: Prof. Ashraf Salem

Date: / /

Learning Method /ILO Matrix

Learning Method	a1	a2	a3	a4	b1	b2	b3	b4	c1	c2	d1	d2	d3
Lecture	•	•	•	•	•	•	•	•	•	•	•	•	•
Tutorial	•	•	•	•	•	•	•	•	•	•	•	•	•

Assessment Methods /ILO Matrix

Assessment	a1	a2	a3	a4	b1	b2	b3	b4	c1	c2	d1	d2	d3
Labs : Assess practical skills and attitudes									•	•	•	•	•
Midterm examination : Assess knowledge of course material	•	•	•		•								
Final term examination : Assess problem solving and intellectual skills	•	•	•	•	•	•	•	•					

Course Coordinator: Prof. Hani Kamal Mahdi

Head of Department: Prof. Ashraf Salem

Date: / /

Course specifications of

Course Name: Technical English Language – Code HUM X11

University: Ain Shams **Faculty: Engineering**

Program on which the course is given:	All Programs
Major or minor element of program :	N.A.
Department offering the program :	All Departments
Department offering the course:	**Physics Department**
Academic year/ Level:	First year
Date of specification approval:	

A- Basic Information

Title:	Technical English language	**Code:**	UM X11
Credit Hours:	**N.A.**	**Lecture:**	2
Tutorial :	0	**Practical:**	0
Total:	2		

B- Professional Information

1- Overall aims of course

This course aims to:

Enrich the student's basic knowledge about English grammar principles.
Develop the student's ability to understand English sentences.
Improve student's ability to recognize organizational patterns within the English language;
Improve student's ability to use English effectively in different environments.
Train students to pass personnel interview

2- Intended learning outcomes of course (ILOs)

1. Knowledge and understanding

By completing this course successfully, the student will be able to:

a1- Explain the usages of languages elements; nouns, verbs, pronouns and adjectives
a2- Recognize the principles of English language grammar.
a3- Outline the personnel interview request.
a4- State the elements of curriculum vita and employment request form
a5- Translate the most scientific Arabic words into their corresponding English words
a6- Define most common scientific expressions.

Course Coordinator: Dr. Mohamed Ahmed Awad

Head of Department: Prof. Dr. Niveen Mohamed Badra

Date: / /

2. **Intellectual skills**
   By completing this course successfully, the student will be able to:

   b1- Use statements parts correctly; verbs, nouns, pronouns and adjectives.
   b2- Construct complete correct English statements.
   b3- Demonstrate the ability to think critically by bringing evidence in support of an argument.
   b4- Demonstrate the ability to learn new words
   b5- Demonstrate the ability to recognize parts of sentence in various word forms

3. **Professional and practical skills**
   By completing this course successfully, the student will be able to:

   c1- Respond to questions that call for reasoned analysis of given information
   c2- Demonstrate ideas in different environments.
   c3- Write complete curriculum vita and employment form

4. **General and transferrable skills:**
   By completing this course successfully, the student will be able to:

   d1. Discuss others in different subjects
   d2. Write a report on different subjects.

Learning Method

Lecture
Audio Visual E-learning

3- Contents

No	Course Content	Lecture	Others	Total
1	Learning sentence parts; verbs, noun,….	4		**4**
2	Using verbs; simple, continuous; and present	4		**4**
3	Using nouns and adjectives	2		**2**
4	Idioms, synonyms and antonyms	2		**2**
5	Writing correct sentences and common mistakes	6		**6**
6	Most common technical expression	2		**2**
7	Communication skills	2		**2**

Course Coordinator: Dr. Mohamed Ahmed Awad

Head of Department: Prof. Dr. Niveen Mohamed Badra

Date: / /

8	|Interview communications	2		**2**
9	Writing curriculum vita	2		**2**
10	Speaking skills	4		**4**
	Total	30		**30**

1- Assessment schedule

Assessment method	No	Description	Week No	Weight (%)
Written Exam	1	Final term examination	16	100
Total				100 %

2- List of references

- **a. Course notes**
  -Developed by course instructors and reviewed by course coordinator
- **b. Essential books (text books)**
- **c. Recommended books**
  - ---- ---- ----
- **d. Periodicals, Web sites, … etc**
  - ---- ---- ----

3- Facilities required for teaching and learning

Blackboard and data show in lectures.
E learning materials

Course Content/ILO Matrix

Course Content	a1	a2	a3	a4	a5	a6	b1	b2	b3	b4	b5	c1	c2	C3	d1	d2
Learning sentence parts; verbs, noun,….	×	×				×										
Using verbs; simple, continuous; and present	×	×				×										
Using nouns and adjectives	×	×				×		×								

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Date: / /

Idioms مترادفات	×	×				×		×								
مضادات	×	×						×								
Most common technical expression							×		×	×	×	×		×		
Communication skills					×							×	×	×	×	×
Interview communications			×									×	×	×	×	×
Writing curriculum vita				×						×	×					
Speaking skills										×		×	×	×	×	

Learning Method /ILO Matrix

Course Content	a1	a2	a3	a4	a5	a6	b1	b2	b3	b4	b5	c1	c2	c3	d1	d2
Lecture	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
E- learning									×		×	×	×	×	×	

Assessment Methods /ILO Matrix

Assessment	a1	a2	a3	a4	a5	a6	b1	b2	b3	b4	b5	c1	c2	c3	d1	d2
Final term examination	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×

Course Coordinator: Dr. Mohamed Ahmed Awad

Head of Department: Prof. Dr. Niveen Mohamed Badra

Date: / /

Course specifications of

Mathematics (2)_E - PHM 112E

University: Ain Shams **Faculty: Engineering**

Program on which the course is given:	All 3 Electrical Engineering programs.
Major or minor element of program :	N.A.
Department offering the program :	All 3 Electrical Engineering Departments
Department offering the course:	Engineering Physics and Mathematics
Academic year/ Level:	second year, First and Second semester
Date of specification approval:	

A- Basic Information

Title:	Mathematics (2)_E	**Code:**	PHM-112E
Credit Hours:	N.A.	**Lecture:**	4
Tutorial :	2	**Practical:**	0
Total:	6		

B- Professional Information

1- Overall aims of course

By the end of the course the students will be able to:

- Deal with basic concepts of functions of several variables such as domain, limits, and continuity.
- Evaluate partial derivatives directly or by chain rule.
- Find extreme values and apply the method of Lagrange multipliers.
- Evaluate all types of multiple, line, and surface integrals in different coordinate systems.
- Derive, know, and use expansions of elementary functions of one and several variables.
- Solve differential equations of the first and higher orders by almost all known methods and apply them to physical and engineering problems.
- Expand periodic functions into Fourier series.
- Identify and classify partial differential equations, and solve applied initial and boundary value problems by D'Alambert's and separation of variables methods.
- Define Laplace transform and its properties, and apply it to solve differential and integral equations related to electrical and mechanical problems.
- Use all concepts related to vector analysis, and the applications of the divergence and Stoke's theorems.
- Use Lagrange's, Newton's divided difference, Newton's forward and backward methods to find a polynomial that interpolates a tabulated data.

2- Intended learning outcomes of course (ILOs)

a. Knowledge and understanding

a1 – Define fundamental concepts of linear differential equations with constant coefficients.
a2 - Define fundamental concepts of functions of several variables including limits and continuity.
a3 - Define fundamental concepts of chain rule and Lagrange multipliers.
a4 – Describe fundamental concepts of double, triple, line, and surface integrals, Green's theorem.
a5 - Describe fundamental concepts of Fourier series.
a6 - Describe fundamental concepts of Laplace transform.
a7 – Define partial differential equations.
a8 – Use interpolation and curve fitting.
a9 – Define basic concepts of vector analysis

b. Intellectual skills

b1 – Use techniques of differential equations to solve many of engineering problems he may face.
b2 – Apply multiple integral techniques to electrical problems.
b3 – Apply curve fitting techniques on experimental data.
b4 – Demonstrate ability to utilize integral transform analysis to solve various problems

c. Professional and practical skills

c1 – Differentiating between scalar field and vector field analyses.
c2 – Solving differential equations modeling electrical engineering problems.
c3 – Analyzing various types of signals using Fourier series and Laplace transform.
c4 – Modeling data using curve fitting and interpolation.

d. General and transferable skills

d1 – Apply different mathematical methods in practical engineering problems.
d2 – Compare theoretical and practical problems.

3- Contents

No	Course Content	Lecture (hours)	Tutorials	Total
1	Ordinary Differential Equations	**16**	**8**	**24**
2	Linear Differential Equations with Constant Coefficients	**16**	**8**	**24**
3	Expansion of Functions	**6**	**2**	**8**
4	Functions of several variables	**8**	**4**	**12**
5	Multiple integrals	**10**	**4**	**14**
6	Extrema and Laplace transform	**15**	**6**	**21**
7	Fourier series	**10**	**4**	**14**
8	Partial differential equations	**18**	**10**	**28**
9	Vector Analysis	**18**	**12**	**30**
10	Interpolation & Curve Fitting	**3**	**2**	**5**
	Total Teaching Hours	**120**	**60**	**180**

4- Assessment schedule

Assessment method	No	Description	Week No	Weight (%)
Attendance Attendance	1	Attendance Attendance	Week 2	3
Assignments Assignments	2	Assignment 1	Week 7	3
Quiz	3	Quiz	Week 8	3
Midterm Exams	4	Midterm Exams	Week 9	16
Assignments	5	Assignment 2	Week 12	3

Assignments				
Final Exam	6	Final Term Exam	Week 15	72
Total				100

5- List of references

5. 1 Course notes

-Math Staff memebers, "Engineering Mathematics (2) Part A"
-Math Staff memebers, "Engineering Mathematics (2) Part B"

5. 2 Essential books (text books)

- E.Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sonds, 1998 or later.
- E.W. Swokowski, M. Olinick and others, "Calculus", PWS Publ. Co., Eighth Ed., 2002 or any subsequent edition.

6- Facilities required for teaching and learning

- Appropriate teaching class including presentation board.

Course Content/ILO Matrix

Course Content	a1	a2	a3	a4	a5	a6	a7	a8	b1	b2	b3	c1	c2	d1	d2
Ordinary Differential Equations	●		●		●				●			●			
Linear Differential Equations with Constant Coefficients		●		●		●		●		●			●		
Expansion of Functions			●				●				●	●		●	
Functions of several variables		●					●				●		●		●
Multiple integrals		●						●		●			●		●
Extrema and Laplace transform			●			●		●		●			●		●
Fourier series				●		●		●			●		●		●
Partial differential equations					●				●				●		●
Vector analysis				●		●				●		●		●	
Interpolation & Curve Fitting				●				●	●		●		●		●

Course Coordinator: **Prof. Dr. Moshira. M. Amin**

Head of Department: **Prof. Dr. Niveen Badra**

Date:

Learning Method /ILO Matrix

Course Content	a1	a2	a3	a4	a5	a6	a7	a8	b1	b2	b3	c1	c2	d1	d2
Lecture		●	●	●				●	●		●	●	●	●	
Class Tutorials	●			●	●	●	●		●	●					●

Assessment Methods /ILO Matrix

Assessment	a1	a2	a3	a4	a5	a6	a7	a8	b1	b2	b3	c1	c2	d1	d2
Attendance and Participation Attendance: Attendance Attendance	●		●		●									●	●
Assignments Assignment 1		●		●		●			●			●		●	
Quiz: Quiz			●			●				●			●		●
Midterm Exams				●			●	●			●	●		●	
Assignments Assignment 2		●		●		●				●			●	●	
Final Exam	●		●		●		●	●			●	●			●

Course Coordinator: **Prof. Dr. Moshira. M. Amin**

Head of Department: **Prof. Dr. Niveen Badra**

Date:

Course Specification

Physics (2) - PHM 122

University: Ain Shams | Faculty: Engineering

Programme on which the course is given: All 4 Mechanical Engineering
Major or minor element of programme: N.A.
Department offering the programme: All 4 Mechanical Engineering
Department offering the course: Engineering Physics and Mathematics
Academic year/ Level: 1st year, First semester
Date of specification approval:

A- Basic Information

Title: Physics (2)	Code:	PHM 122		
Credit Hours: N.A.	Lecture:	2 H		
Tutorial: 0 H	Practical:	2 H		Total: 4 H

B- Professional Information

1- Overall aims of course

By the end of the course the students will be able to:

Understand Schrodmger equation and use it to solve some problems like the potential well and the simple harmonic oscillator

Know and understand the wave-particle duality of both particles and light waves Understand the superposition principle and apply it to different wave cases (change in amplitude, phase, frequence or direction of propagation)

Understand the limitations of classical physics in explaining the black body radiation and photoelectric effect and understand the Quantum Theory of Radiation and its ability to explain both effects in addition to line spectra of different elements

Understand the physical nature of light waves and its mathematical representation and apply it together with the superposition principle to explain and understand Interference, diffraction and Polarisation of light

Identify a simple harmonic oscillator, know and understand the physical laws governing its action and energy, understand the mathematical laws that models an oscillating physical quantity and apply it to the case of an RLC circuit.

Understand sound as a mechanical wave and understand the doppler effect and some of its applications

Identify the atomic structure and differentiate between classical and quantum statistics

2- Intended learning outcomes of course (ILOs)

By the end of this course, the student will be able to:

a. Knowledge and Understanding

al - Identify the mathematical laws that models an oscillating physical quantity.
a2 - Identify the doppler effect of the sound wave and some of its applications
a3 - Outline the superposition principle
a4 - Identify Interference, diffraction and Polarization of light
a5 - Describe the Special Theory of relativity
a6 - Explain the black body radiation, photoelectric effect, in addition to line spectra of different elements

a7 - Know the Difference between classical and quantum statistics

b. Intellectual skills

bl - Select appropriate mathematical methods for analyzing physical problems related to Classical and Quantum statistics.
b2 - Assess and evaluate the characteristics and performance of mechanical and electrical harmonic oscillator.
b3 - Apply the basic concepts and theories on the wave formation and propagation in media.
b4 - Use scientific process to analyse and solve problems of Quantum Theory of Radiation.

c. Professional and practical skills

cl - Collect and analyze experimental data that are used to investigate physical phenomena
c2 - Compare experimental results to the mathematical/ theoretical description.
c3 - Manipulate instruments and devices used in experimental physics.
c4 - Prepare and present technical reports.

d. General and transferable skills

dl - Search for information and engage in life-long self-learning discipline.
d2 - Collaborate effectively within multidisciplinary team.
d3 - Effectively manage tasks, time, and resources.

3- Course Content

No.	Course Content	Lecture Hours	Lab Hours	Total Hours
1	Vibrations	**8**		**10**
2	Superposition principles	**9**	**3**	**5**
3	Mechanical and sound waves	**4**		**5**
4	Physical optics	**9**	**6**	**10**
5	Special theory of relativity	**6**		**5**
6	Quantum theory of radiation	**4**	**3**	**10**
7	Wave properties of matter	**5**	**3**	**5**
	Total Hours	**45**	**15**	**60**

Course content distributed over 15 weeks

4- Assessment Method

No.	Assessment method	Description	Week No	Weight Marks
1	Written exam	Mid-term exam	Week 8	**10**
1	Written reports	Measure and data analysis	Week 9	**10**
1	Oral Exam	Perform Exp.	Week 10	**20**
2	Written exam	Final exam	Week 15	**60**
			Total	**100%**

5- List of References

5.1 Course Note: NA

5.2 Essential Books:

1. Physics for Scientists and Engineers with Modern Physics by Serway and Jewett, 8th edition, Brooks Cole Publishing, 2010
2. Engineering Electromagnetics by William H. Hayt and John A. Buck, 6th edition, McGraw Hill Companies, 2010.
3. Halliday-Resnick-Walker-Fundamentals of Physics - 9th Edition Extended

3.5 Recommended books: NA

6- Facilities required for teaching and learning

- Appropriate teaching class accommodations including presentation board, projector, and data show.
- Lab equipped with experimental setups and Computer CD.

7- Course Content/ILO Matrix

Course Content	a1	a2	a3	a4	a5	a7	b1	b2	b3	b4	c1	c2	c3	c4	d1	d2	d3
Vibrations	●			●			●			●			●		●		
Superposition principle and applications		●	●		●	●		●	●		●	●		●		●	●
Mechanical and sound waves			●			●			●			●					●
Physical Optics			●			●			●			●			●		
Special Theory of Relativity	●			●	●			●			●		●			●	●
Quantum Theory of Radiation		●	●			●	●		●	●		●		●	●		●
Wave properties of matter			●				●			●					●		

8- Learning Method /ILO Matrix

Learning Method	a1	a2	a3	a4	a5	a7	b1	b2	b3	b4	c1	c2	c3	c4	d1	d2	d3
Lecture classes	●	●		●		●		●	●	●		●		●	●	●	
Laboratory Experiments			●		●		●				●		●				●

9- Assessment Methods / ILO Matrix

Assessment	a1	a2	a3	a4	a5	a6	a7	b1	b2	b3	b4	c1	c2	c3	c4	d1	d2	d3
Written Exams : Mid-term	●			●		●			●	●		●			●			●
Written Reports : measure and data analysis		●	●		●		●	●			●		●	●		●	●	
Oral Exam : Perform experiment and obtain results			●					●						●			●	
Written Exams : Final			●					●						●			●	

Course Coordinator: **Dr Ahmed Shaker**
Signature:

Department Head: Prof. Dr. Nevine Badra

Course specifications of

Mechanics (2) - PHM 132

University: Ain Shams **Faculty: Engineering**

Programme on which the course is given	All 4 Mechanical Engineering Programs
Major or minor element of programme	N.A.
Department offering the programme	All 4 Mechanical Engineering Departments
Department offering the course :	Engineering Physics and Mathematics
Academic year/ Level :	Second year, First semester
Date of specification approval :	

A- Basic Information

Title: Mechanics (2) **code:** PHM-132
Credit Hours: N.A. **Lecture :** 2
Tutorial: 2 **Practical** **0** **Total:** 4

B- Professional Information

1 – Overall aims of course

By the end of the course the students will be able to:

- Evaluate the location of the center of mass
- Locate the centroids of Volumes, areas, and curved lines
- Evaluate the area moments and product of inertia
- Recognize principle axes
- Use the parallel axis theorems to transfer area inertia properties between parallel coordinate systems
- Evaluate the inertia properties of composite areas
- Evaluate the velocity and acceleration of a point on a rigid body
- Identify points on a rigid body whose movement is constrained and to write the corresponding constraint equations governing the velocity and acceleration of such points
- Employ the concept of instantaneous center of zero velocity to elate the velocity of points in a rigid body to the angular velocity of the body
- Relate the angular motions of two bodies that roll over each other without slipping and to use such relations to determine the motions of points on either body.
- Formulate the basic equations of motion, which requires (a) using free body diagrams as an aid in summing force components and moments, (b) identifying the appropriate point for summing moments based on the type of motion, © using the kinematical constrai
- Employ the work-energy principle to relate the velocity of a body at two different positions. This involves (a) expressing the kinetic energy of a body in terms of the velocity of a point or the angular velocity of the body, (b) using potential energy to

Course Coordinator: Prof. Dr.Adalla El Marhomy
Head of Department: Prof. Dr. Niveen Badra
Date: / /

- Employ the angular and linear impulse momentum equations to relate the motion of a rigid body at two different time instants, (a) when time is explicit in the problem, and (b) when the problem involves impulsive forces

2- Intended learning outcomes of course (ILOs)

a- knowledge and understanding

a1 - Distinguish between motion of particle and rigid body

a2 - Know the velocity and acceleration any point of rigid body.

a3 - Locate the centroid of different cross-sectional areas and volumes.

a4 - Determine the moment of inertia of areas and masses

a5 - Understand the concept of motion of machines and frames.

a6 - Know the applications of motion for the rigid body.

a7 - Apply conservation law of Energy for a rigid body

b-Iintellectual skills

b1 - Discriminate between different types of motion of bodies.

b2 - Gain the intellectual skills of solving motion of system of bodies

b3 - Formulate the equations of motion of a rigid body.

b4 - Describe the motion of rigid body.

b5 - Apply Newton's Second law in general plan motion of rigid bodies.

b6- Choose the generalized coordinates.

c-Professional and practical skills

c1 - Design and perform experiments for the motion of a rigid body.

c2 - Specify the problem

d-General and transferable skills

d1 - Work effectively in team.

d2 - Develop skills related to creative thinking, problem solving, oral and written communication, and teamwork in different fields.

3- Contents

No	Course Content	Lecture	Tutorial	Total
1	Kinematics of Rigid body	6	4	10
2	Center of Mass and Centroid	4	4	8
3	Moment of Inertia	4	4	8
4	Kinetics of Rigid Body: Force and Acceleration Method	4	6	10
5	Kinetics of Rigid Body:Work and Energy Method	6	6	12
6	Kinetics of Rigid Body:Impulse and Momentum Method	6	6	12
Total Hours		30	30	60

4- Assessment schedule

Assessment method	No	Description	Week No	Weight (%)
Quizzess	1	Kinematics of Rigid Body	Week 3	2
Assignments	1	Moment of inertia	Week 5	2
Quizzess	2	Center of mass	Week 6	3
Assignments	2	Kinetics of Rigid Body	Week 7	3
Mid-term exam		Solving Problems	Week 9	20
Final Exam		Solving Problems	Week 15	70
Total				100 %

5- List of references

5. 1 Course notes

- ---- ---- ----

5. 2 Essential books (text books)

- J.L.Meriam & L.G.Kraige, "Engineering Mechanics (Statics & Dynamics)", John Wiley and Sons
- Irving Shames, "Engineering Mechanics (Statics & Dynamics)", Prentice Hall
- R.C.Hibbler, "Engineering Mechanics (Statics & Dynamics)", Macmillan
- F.P.Beer & E.R.Johnston,Jr. , "Vector Mechanics For Engineers (Statics & Dynamics)", McGraw Hill

5. 3 Recommended books

- Mechanics Staff members, "Rigid Body Dynamics"

Course Coordinator: Prof. Dr.Adalla El Marhomy

Head of Department: Prof. Dr. Niveen Badra

Date: / /

6- Facilities required for teaching and learning

- A mechanics lab exists but no hours are assigned

Course Content/ILO Matrix

Course Content	a1	a2	a3	a4	a5	a6	a7	b1	b3	b4	c1	c2	d2
Kinematics of Rigid body	●	●						●	●				
Center of Mass and Centroid			●									●	●
Moment of Inertia				●									
Kinetics of Rigid Body: Force and Acceleration Method					●	●				●	●	●	
Kinetics of Rigid Body:Work and Energy Method							●					●	
Kinetics of Rigid Body:Impulse and Momentum Method						●						●	

Learning Method /ILO Matrix

Learning Method	a1	a2	a3	a4	a5	a6	a7	b1	b3	b4	c1	c2	d2
Lecture		●	●	●			●	●	●			●	●
Tutorial	●			●	●	●			●	●	●		

Assessment Methods /ILO Matrix

Assessment	a1	a2	a3	a4	a5	a6	a7	b1	b2	b3	b4	c1	c2	d2
Quizzess : Kinematics of Rigid Body	●	●						●		●				
Assignments : Moment of inertia				●									●	
Quizzess : Center of mass			●										●	●
Assignments : Kinetics of Rigid Body					●	●					●	●		
Mid-term exam : Solving Problems	●	●	●	●				●	●		●			
Final Exam : Solving Problems	●		●				●						●	

Course Coordinator: Prof. Dr.Adalla El Marhomy

Head of Department: Prof. Dr. Niveen Badra

Date: / /

Course Specifications of

Manufacturing technology (1) – MDP 111

University: Ain Shams	Faculty: Engineering
Program on which the course is given	All Mechanical Engineering Programs
Major or minor element of program	N/A
Department offering the Program	All Mechanical Engineering Programs
Department offering the course	Design and Production Engineering
Academic year/ Level	1^{th} year Mechanical Engineering
Date of specification approval	2013

A – Basic Information

Title	Manufacturing Technology (1)	Code	MDP 111
Credit Hours	N/A	Lecture	4 hours/Week
Tutorial	3 hours/Week	Total	7 hours/Week

B- Professional Information

1- Overall aim of course

By the end of this course student will be able to:

1	Recognize and demonstrate the different machining processes (conventional and non conventional) & metal forming processes.
2	Calculate the machining time for different cutting processes.
3	Recognize the different methods of workpiece and tool fixation

2- Intended Learning Outcomes (ILOs)

a	**Knowledge and understanding**
a1	Describe the different manufacturing processes
a2	Explain the movement of the machine and work piece for the different cutting process
a3	List the different machine elements parts.
a4	Explain the different forming process parameters
a5	Explain the different machining processes
a6	Explain the different forming processes
b	**Intellectual skills**
b1	Differentiate between the different metal cutting operations
b2	Evaluate the advantages and disadvantages of the metal cutting process
b3	Choose suitable process for a designed work piece the same thing for metal forming processes
c	**Professional and practical skills**

c1	Use appropriate machining workshop equipments
	Use appropriate forming workshop equipments
c2	Setup the machines for real cut in lab.
c3	Criticize the forming processes technologies
d General and transferable skills	
d1	work efficiently within a team
d2	Present the new trend in both forming and machining in oral seminar.
d3	Work as a part of a project team in building real case study.

3 - Contents

Part1 Machining: Principles of machining, materials of cutting tools, turning machines and Processes. Milling machines and processes, Grinding machines and processes. Methods of tools and work piece fixation, machining time, Non conventional cutting processes (ECM, EDM, USM, AJM, WJM and AWJM).

Part2 Forming: Mechanical behavior of the materials, plastic deformation, Effect of temperature on plastic behavior, types of forming processes; Hot, cold, massive or sheet metal work, Metal forming processes. Forging and its types. Rolling, Extrusion, Types of drawing(rod, wire, tube and deep). Sheet metal work (shearing, pressing, blanking, spinning, bending, coining, etc), Brief explanation to forming machines and equipments, Heat treatment of alloys; diffusion and phase transformation in alloys, Heat treatment processes for iron and steel alloys, heat treatment processes for non ferrous alloys.

No	Topic	Lecture	Tutorial	Total
1	Machining principles	2	4	6
2	Turning processes and Lathe machine	8	8	16
3	Drilling processes and machine	2	4	6
4	Milling processes and machine	6	6	12
5	Grinding processes and machine	4	4	8
6	Tool and work piece fixation on machines	4	2	6
7	Non conventional machining processes 1	2		2
8	Non conventional machining processes 2	2		2
9	Mechanical behaviors or materials	4		4
10	Forming classifications	4		4
11	Massive forming process and machines	8	4	12
12	Sheet metal forming and machines	4	5	9
13	Forming machine principles	2	2	4
14	Forming machines, press and hammers	4	4	8
15	Heat treatment of steel, alloys and non ferrous	4	2	6
TOTAL HOURS		**60**	**45**	**105**

Teaching and learning methods

1	Class lectures
2	Tutorials

3	Experimental Laboratory work
4	Mini project seminar

4- Student assessment methods

1	Written exams (midterm/final)
2	Assignment
3	Oral seminar
4	Study report

Assessment Method	No	Description	Week	Weight
Assignment	**1**	Assignment 1	4	1%
Study report	**3**	Report1	5	5%
Assignment	**2**	Assignment 2	6	1%
Written exams	**5**	Midterm exam	7	10%
Assignment	**4**	Assignment 3	9	1%
Study report	**7**	Report2	10	5%
Assignment	**6**	Assignment 4	11	1%
Oral Project discussion	**8**	Oral discussion	14	6%
Written exams	**9**	**Final Exam**	15	70%
		Total		100%

5. List of references

	Description	Details
5.1	Course notes	Distributed by the Author
5.2	References books	Serope Kalpakjian Manufacturing Engineering Technology, Addison Wesley Publishing co. 1992.
		Walker, John R., Machining Fundamentals, The Goodheat Willcos Co., 1993.
		Kalpakjian, S., Manufacturing Engineering and technology, Addison Wesley Publishing Co., 1995.
		- Krar, S. F., Technology of Machine Tools, McGraw Hill Co., 1996.
		Groover, Mikell P., Fundamentals of Modern Manufacturing, Prentice Hall Int., 1996.
5.3	Recommended Books	
5.4	Periodical, Web Sites	

6. Facilities required for teaching and learning
Appropriate teaching class hall/ Presentation board/ Data show.
Machining lab. equipped with educational workstations.
Metal Forming lab. equipped with educational workstations.
Heat Treatment lab.

7- ILOS Matrices

Course Content / ILO Matrix

Course Content	a1	a2	a3	a4	a5	a6	b1	b2	b3	c1	c2	c3	d1	d2	d3
Machining principles	●														
Turning processes and Lathe machine		●													
Drilling processes and machine		●													
Milling processes and machine			●							●					
Grinding processes and machine			●				●	●	●						
Tool and work piece fixation on machines			●				●	●	●						
Non conventional machining processes 1				●			●	●	●		●		●		
Non conventional machining processes 2				●			●	●	●		●		●		
Mechanical behaviors or materials				●								●			
Forming classifications					●							●	●		
Massive forming process and machines						●								●	●
Sheet metal forming and machines						●								●	●
Forming machine principles						●								●	●
Forming machines, press and hammers						●									
Heat treatment of steel, alloys and non ferrous						●									

Learning Method / ILO Matrix

Learning Method	a1	a2	a3	a4	a5	a6	b1	b2	b3	c1	c2	c3	d1	d2	d3
Lecture	●	●	●	●	●	●									
Tutorial							●	●	●						
Lab, Software										●	●	●			
Seminar		●	●						●				●	●	●

Assessment Methods / ILO Matrix

Assessment Method	a1	a2	a3	a4	a5	a6	b1	b2	b3	c1	c2	c3	d1	d2	d3
Assignment 1	●	●	●												
Report1										●	●				
Assignment 2				●	●										
Midterm exam	●	●	●	●			●	●							
Assignment 3					●	●									
Report2												●			
Assignment 4					●	●	●	●	●						
Oral discussion													●	●	●
Final Exam	●	●	●	●	●	●	●	●	●						

Course specifications of

Materials Engineering & Testing – MDP 131

University: Ain Shams **Faculty: Engineering**

Program on which the course is given:	**All Mechanical Engineering B.Sc. Programs**
Major or minor element of program:	N. A.
Department offering the program:	All mechanical engineering departments
Department offering the course:	Design and Production Engineering
Academic year/ Level:	1^{st} year, first and second terms
Date of specification approval:	1/8/2013

A- Basic Information

Title:	Materials Engineering & Testing	**Code:**	MDP 131
Credit Hours:	**N.A.**	**Lecture:**	4
Tutorial :	2	**Practical:**	2
Total:	8		

B- Prerequisite Courses

Physics (1) PHM 021, Physics (2) PHM 122, Chemistry PHM 041,
Production Technology and Engineering history MDP 022, Theory of Structures CES112

C- Course Description

This course provides a general treatment of the principles and problems of engineering materials and testing with specific reference to the mechanical properties. It also covers the common methods of static and dynamic testing, tension, compression, bending, hardness, creep, and fatigue. A brief explanation of non-destructive testing of materials is also included.

D- Professional Information

1- Overall aims of course

By the end of the course the students will be able to:

- Identify the different types of materials (metals, polymers, ceramics and composites).
- Identify the basic crystal structures and its effects on the general properties of the materials.
- Discuss the solidification process of pure metals and alloys.
- Discuss what is meant by grain size and its effects on properties.
- Provide with a working knowledge of how to read and use phase diagrams of metals' alloys and ceramics.
- List the common imperfections found in materials and discuss their effects on the materials properties.
- Discuss the different methods of strengthening mechanisms
- Discuss the iron-cementite phase diagram and what is meant by quench, temper, and softening.
- Identify the major types of carbon steels, stainless steel, and cast iron.
- Discuss the common type of plastics, ceramic and composites, their major properties and applications.
- Understand the significance of materials testing and inspection.

- Understand the importance of standardization and list the common agencies for standardization.
- Read, interpret and use well the standards.
- Discuss the general features of mechanical behavior.
- Discuss carefully, the definitions of the mechanical properties.
- Discuss carefully, structure-property relationship.
- Demonstrate the stress-strain relation and study all the parameters related to.
- Discuss how the load, length, and deformation measure.
- Recognize different type of testing machines.
- Discuss the different type of applied loading.
- Discuss running tensile, compression, bending, shear, hardness, creep, impact, fatigue tests and NDT.
- Identify the major requirements for the test sample in each test.
- Discuss the common factors that affecting the parameters in each test.
- Conduct experimentally the main mechanical tests.

2- Intended learning outcomes of course (ILOs)

a. Knowledge and understanding

a1- Define different crystal structures and their reflection on the properties
a2- Use the linear and planer densities, grain size
a3- Define cooling curves for Pb-Sn system
a4- Define and solve the phase diagrams problems
a5- Define the material through stress strain curve
a6- Identify the testing problems
a7- Describe stress-strain behavior of any material and the main factors that are affecting it. S-N curve for fatigue and strain-time curve for creep

b. Intellectual skills

b1- Select the suitable material for certain use
b2- Select alternative materials for an existing product
b3- Construct phase diagrams from the data comes from the cooling curves.
b4- Compare between different driving systems of universal testing machines with use limitations;
b5- Construct stress- strain diagram from the data comes from the testing machine;
b6- Analyze results of stress-strain, S-N, strain-time relationships.

c. Professional and practical skills

c1- Identify different type of materials visually and using simple technical methods
c2- Conduct microstructure examination techniques and equipment
c3- Conduct an experiment to define the cooling curves for Pb-Sn system
c4- Identify different methods of testing the materials.
c5- Use the universal testing machine, hardness machines, impact machines

d. General and transferable skills

d1- Collaborate effectively within multidisciplinary team;
d2- Search for information and adopt life-long self-learning;
d3- Refer to relevant literature effectively;
d4- Write technical reports and conduct presentation.

Course Coordinator: Prof. Dr. Adel M. Badawy El-Shabasy

Head of Department: Prof. Dr. Hesham Sonbel

Date: 30 / 09 / 2014

3- Contents

No	Course Content	Lecture (hrs)	Tutorial/ Laboratory (hrs)	Total (hrs)
1	Materials Classification	3	4	7
2	Crystal structures	4	4	8
3	Imperfection of crystal structures	4	2	6
4	Alloying and phase diagrams	5	6	11
5	Iron-cementite phase diagram	3	6	9
6	Annealing and hardening	3	6	9
7	Steels and cast iron properties and applications	4	2	6
8	Non-ferrous Metals	4	2	6
8	Polymers, ceramics, and composites	4	2	6
9	Introduction, structure-property relationship, Significance of testing and standards	2	2	4
10	Mechanical Properties and materials flow behaviour	2	2	4
11	Tension test	4	4	8
12	Compression test	2	2	4
13	Hardness test	2	2	4
14	Bending test	2	2	4
15	Impact test	2	2	4
16	Shear and torsion test	2	2	4
17	Fatigue test	4	4	8
18	Creep test	2	2	4
19	Fundamentals of non-destructive testing and inspection, Visual methods, liquid penetrate methods, ultrasonic, X-ray,)	2	2	4
	Total hours	60	60	120

Course Coordinator: Prof. Dr. Adel M. Badawy El-Shabasy

Head of Department: Prof. Dr. Hesham Sonbel

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4- Teaching and learning methods

4.1- Class Lectures.
4.2- Metallography lab.
4.3- Tutorials.
4.4- Internet search.

5- Student assessment methods

5.1- Assignments to assess ability to solve problems and analyze results independently
5.2- Quiz to assess ability to solve problems and analyze results independently
5.3- Report to assess practical, and presentation skills
5.4- Mid-Term exam to assess understanding and scientific knowledge
5.5- Written final exam to assess understanding and scientific knowledge

Formative only assessments: Laboratory attendance, and interactive participation

6- Assessment schedule

Assessment method	No	Description	Week No	Weight (%)
Attendance		Attendance	Weekly	2
Assignments		Assignments	2, 3, 5, 7, 9, 11, 13	2
Reports		Project Reports	11	2
Quiz		Quiz	Anytime	4
Mid-term		Mid-term	8	10
Oral Exam		Oral Exam	14	20
Final written exam		Final exam	15	60
Total				100 %

7- List of references

a. Course notes

- Lecture Notes:sent to all students via internet
- Laboratory manuals provided by the course instructors

b. Essential books (text books)

1- W. D. Callister, Materials Science and Engineering, 6th edition, Wiley, 2002.
2- M. F. Ashby and D. R. H. Jones, Engineering Materials II: An Introduction to Microstructures, Processing, and Design.
3- أحمد سالم الصباغ , هندسة المواد - الجزءالأول: الميتالورجيا الفيزيائية،عالم الكتب للنشر
4- أحمد سالم الصباغ , هندسة المواد – الجزء الثانى: الاختبارات،عالم الكتب للنشر

c. Reference books

1- Donald R. Askeland, "The Science and Engineering of Materials", PWS publishing company, 1994
2- William D. Callister, "Materials Science and Engineering- An Introduction", John Wiley and Sons Inc., 1985.

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3- James F. Shachelford., “Introduction to Materials Science for Engineers”, Pearson Prentice Hall, 2004.
4- Lawrence H. Van Vlack, “Materials for Engineering- Concepts and Applications”, Addison-Wesley Publishing company, Inc, 1982.
5- Harmer E. Davis, George Earl Troxell, “The Testing and Inspection of Engineering Materials”, McGraw-Hill Book Company, 1955

d. Periodicals, Web sites, … etc

www.steeluniversity.org
www.mmat.ubc.ca
www.materials.eng.cam.ac.uk
www.matweb.com
www.key-to-steel.com
www.info.com

8- Facilities required for teaching and learning

- Appropriate teaching class accommodations including presentation board and data show
- Metallographic, well equipped, Lab
- Materials Testing Lab

Course Content/ILO Matrix

Course Content	a1	a2	a3	a4	a5	a6	a7	b1	b2	b3	b4	b5	b6	c1	c2	c3	c4	c5	d1	d2	d3	d4
Crystal structures	●	●																				
Imperfection of crystal structures	●																					
Strengthening mechanisms	●																					
Alloying and phase diagrams			●							●						●						
Iron-cementite phase diagram				●																		
Annealing and hardening								●	●										●	●		
Steels and cast iron properties and applications								●	●						●				●	●		
Polymers, ceramics, and composites								●	●										●	●		
Introduction, structure-property relationship, Significance of testing and standards				●						●	●										●	●
Mechanical Properties and materials flow behaviour					●		●					●									●	●

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Tension test					●	●	●					●				●	●				●	●
Compression test					●	●						●				●	●				●	●
Hardness test					●	●						●				●	●				●	●
Bending test					●	●						●				●	●				●	●
Impact test					●	●						●				●	●				●	●
Shear and torsion test					●	●						●				●	●				●	●
Fatigue test					●	●						●				●					●	●
Creep test					●	●						●				●					●	●
Fundamentals of NDT and inspection, Visual methods, liquid penetrate methods, ultrasonic, X-ray,)					●																●	●

Learning Method /ILO Matrix

Course Content	a 1	a 2	a 3	a 4	a 5	a 6	a 7	b 1	b 2	b 3	b 4	b 5	b 6	c 1	c 2	c 3	c 4	c 5	d 1	d 2	d 3	d 4
Lecture	●	●	●	●	●	●	●	●	●	●	●	●				●						
Tutorial	●	●	●	●	●	●	●			●	●	●	●			●			●		●	
Laboratory		●			●			●	●		●	●		●	●	●	●		●	●	●	●

Assessment Methods /ILO Matrix

Assessment	a 1	a 2	a 3	a 4	a 5	a 6	a 7	b 1	b 2	b 3	b 4	b 5	b 6	c 1	c 2	c 3	c 4	c 5	d 1	d 2	d 3	d 4
Attendance & participation	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●		●	●	●	●
Assignments	●	●	●	●	●	●	●	●		●			●	●		●		●				
Reports								●	●		●	●							●	●	●	
Quiz	●	●	●																			
Mid-term	●	●		●	●	●	●									●						
Final written exam					●	●	●				●	●	●				●	●				

Course Coordinator: Prof. Dr. Adel M. Badawy El-Shabasy

Head of Department: Prof. Dr. Hesham Sonbel

Date: 30 / 09 / 2014

Course Specifications of

Machine Drawing – MDP161

University: **Ain Shams** **Faculty:** **Engineering**

Program on which the course is given: **All Mechanical Programs**

Major or minor element of program: **N. A.**

Department offering the program: **All Mechanical Engineering Department**

Department offering the course: **Design and Production Engineering**

Academic year /Level: **First Year**

Tutorial:

A- Basic Information

Title: **Machine Drawing** **code: MDP-161**

Credit Hours: **N. A.** **Lecture:-----**

Tutorial: **4 Hrs**
Practical **Total: 4 Hrs**

B- Professional Information

1- Overall aims of course:

The aims of this course are to develop the student's capabilities to:

1 Inspire the student's imagination to grasp and synthesize mental real visualization and images of machine elements, sub-assemblies and complete assemblies using 2D and/or 3D drawings.
2 Motivate students to understand the basic techniques for assembly of machine parts based on its proper functioning using the different types of joints and fits .

3 Train the students to generate and prepare the working and assembly machine drawings necessary for different engineering purposes according to the well-known standards.
4 Train the students to prepare the techno-commercial 3D drawings using the widely spread CAD packages.
5 Train the students on the design office practice in mechanical engineering.

2- Intended Learning Outcomes of Course (IL/Os)

a- Knowledge and Understanding

A1- Identify the elements of a detail working drawing and create a simple detail drawing complete with annotation.

A2- List the common elements of a title block and record strip
A3- Prepare a bill of materials including purchased parts

A4- Recognize the assembly techniques based on the proper functioning of the assembled parts .

A5- synthesize and create a typical drawing sequence of parts.
A6- Construct an assembly drawing of a machine unit based on the well-known types of joints , fits and tolerances.

A7- Construct an exploded assembly drawing of a machine unit.

A8- Calculate and determine the nominal size, tolerance, limits, and allowances of two mating parts for proper functioning.

A9- Explain the basic hole and basic shaft systems, the classes of fits giving examples.

A10- Draw and specify position and geometric tolerances and symbols.

b- Intellectual Skills

B1- Analyze the 2D and the 3D drawings to imagine the real shape and geometry.

B2- Deduce the function of each part in the drawing.

B3- Identify the design concepts behind each part in the drawings.

B4- Create the appropriate working and assembly drawings for each machine unit.

B5- Interpret and create limit dimensions.

B6- Apply the International Organization of Standardization (ISO) tolerances between mating parts on a drawing.

B7- illustrate machine unit assemblies using animated 3D models in a CAD system.

c- Professional and Practical Skills

C1- Draw manually the views of the machine parts given in the class room (drawing theater).

C2- Draw an assembly drawing of a machine unit based on the well-known types of joints , fits and tolerances.

C3- Construct an exploded assembly drawing of a machine unit.

C4- Create 3-D solid models for the given exercises using the 3D – CAD drawing package in the computer lab.

C5- Illustrate machine unit assemblies using animated 3D models in a CAD system.

d- General and Transferable Skills

D1- Prepare complete drawing documentations for the given projects (hard and soft copies.) using the available facilities in the computer room.

D2- Present at least one complete project documentation.

D3- Search the net for the drawing standards and techniques.

D4- Formulate a group for the information exchange about the drawing documentation.

D5- Arrange for a visit to one of the well-known design offices in Cairo.

3- Contents:

Topic No.	Week No.	Course Contents	Lect/Tutorials	Total
1	1	Introduction and course objectives ; DWG the water vent	1/2	3
2	2,3	The threaded joints ; DWG: Knuckle Joint - The control Handle	2/4	6
3	4,5	Standard threads; DWG: pulley&bracket(1) – pulley& bracket(2)	1/5	6
4	6	DWG: crane hook / eccentric	3	3
5	7	DWG: crank shaft / Rocking arm	3	3
6	8	DWG: stuffing box / Damper	3	3
7	9	DWG: Bearing(1) / Bearing(2)	3	3
8	10	Mid Term Exam.	3	3
9	11	DWG: grinding wheel drive/ Worm and worm gear	3	3
10	12	DWG: Machine vice(1) / Machine vice(2)	3	3
11	3 weeks	ACAD exercises for 3-D solid modeling of some planned exercises ; the exer. Are given in the notes.	9	9
12	16,17	Fits and tolerances; DWG: Hand press/Punching press	2/4	6
13	18,19	Fits and tolerances; DWG: transmission shaft/reciprocating mechanism	2/4	6
14	20,21	Dimensioning and geometrical tolerances; DWG: tail stock(1) / tail stock(2)	2/4	6
15	22	Mid- term Exam.		3
16	23	DWG: Rigid coupling / flexible coupling	3	3
17	24,25	Generation of working drawings; DWG: Non return valve(1) / Nun return valve(2)	2/4	6
18	26	DWG: safety valve(1) / Safety valve(2)	3	3
19	27	DWG: Tail stock(1) / Tail stock(2)	3	3
20	3 weeks	ACAD exercises for 3-D solid modeling of some planned exercises ; the exer. Are given in the notes.	9	9
		Total Hours	84	84

3.1. COURSE PLAN

Course Aims					Course ILO's		Course Contents (Topics)															
1	2	3	4	5	Type	No.	1 2	3 4	5 6	7 8	9 0	1 2	3 4	5 6	7 8	19 20	Tutorials	Lab.	Weekly Sheets	Lab. Report	Written Exams.	Exper. Exam.
☺	☺	☺			Knowledge & Understanding	a1	☺	☺	☺	☺	☺						☺		☺		☺	
☺	☺	☺				a2	☺	☺	☺	☺	☺						☺		☺		☺	
☺	☺	☺				a3	☺	☺	☺	☺	☺						☺		☺		☺	
☺	☺	☺				a4	☺	☺	☺	☺	☺						☺		☺		☺	
☺	☺	☺				a5	☺	☺	☺	☺	☺						☺		☺		☺	
☺	☺	☺				a6	☺	☺	☺	☺	☺						☺		☺		☺	
☺	☺	☺				a7			☺	☺	☺	☺					☺		☺		☺	
☺	☺	☺				a8						☺	☺				☺		☺		☺	
☺	☺	☺				a9						☺	☺				☺		☺		☺	
☺	☺	☺				a10						☺	☺				☺		☺		☺	
☺	☺	☺			Intellectual Skills	b1		☺	☺	☺	☺	☺		☺	☺	☺	☺		☺		☺	
☺	☺	☺				b2		☺	☺	☺	☺	☺		☺	☺	☺	☺		☺		☺	
☺	☺	☺				b3		☺	☺	☺	☺	☺		☺	☺	☺	☺		☺		☺	
☺	☺	☺				b4		☺	☺	☺	☺	☺		☺	☺	☺	☺		☺		☺	
☺	☺	☺				b5		☺	☺	☺	☺	☺		☺	☺	☺	☺		☺		☺	

☺	☺	☺				**b6**		☺	☺	☺	☺	☺		☺	☺	☺	☺		☺		☺	
☺	☺	☺		☺		**b7**						☺				☺		☺	☺		☺	
	☺	☺	☺	☺	**Professional & Practical Skills**	**c1**		☺	☺	☺	☺	☺		☺	☺	☺	☺		☺	☺		
	☺	☺	☺	☺		**c2**		☺	☺	☺	☺	☺		☺	☺	☺	☺		☺	☺		
	☺	☺	☺	☺		**c3**		☺	☺	☺	☺	☺		☺	☺	☺	☺		☺		☺	
	☺	☺	☺	☺		**c4**						☺				☺		☺	☺		☺	
	☺	☺	☺	☺		**c5**						☺				☺		☺	☺		☺	
	☺	☺	☺	☺		**c6**																
				☺	**General & Transferable Skills**	**d1**						☺				☺		☺		☺		
				☺		**d2**					☺	☺	☺	☺	☺	☺		☺		☺		
				☺		**d3**					☺	☺	☺	☺	☺	☺		☺		☺		
						d4												☺		☺		
						d5														☺		
						d6																
																	10	**14**				

4– Teaching and learning methods:

4.1- Few Lectures supported by lecture notes.

4.2- Drawing Sheets all over the year

4.3- Demonstrations and presentations containing videos.

4.4- assignment reports during the course

4.5- AutoCAD software Labs.

5- Student assessment methods

5.1 Drawing sheets every week.

5.2 Mid Term Exams (2 off).

5.3. CAD 3-D exercises.

5.3. Final Exam.

6-Assessment Schedule

Assessments method	Description	Week No	Weight
Assessments to asses practice	weekly	weekly	40
CAD exercises	every 3- weeks	week 1	10
Mid-Term – 1 Exam.		week 10	15
Mid-Term – 2 Exam.		week 20	15
Final Exam.		week 30	120
	Total		200

7-List of References

7.1 Course Notes

- **Course drawing notes.**

7.2 Essential Books (Text Books)

- **Hart K. R., " Engineering Drawing with Problems and Solutions", Clark Constable Ltd. Edinburgh (1982).**
- **Gierges F., " Technical Drawing", Machmilan Publisher (1986).**
- **Thomas E. F., " Fundamental of Engineering Drawing", McGraw Hill. (2004).**

8- Facilities Required for Teaching and Learning

- **Classes facilitated with drawing boards and the necessary mechanical drawing facilities.**
- **Computer labs with suitable CAD systems.**
- **Data Show in each class.**
- **About 20 assistants per day**

Course Coordinator: **Prof. Dr. Farid A. Tolbah**

Head of Department: **Prof. Dr. Hesham Senbel**

Date: / /

Course specifications of

Thermodynamics – MEP111

University: Ain Shams **Faculty: Engineering**

Program on which the course is given: Mechanical Power Engineering
Major or minor element of program :
Department offering the program : Mechanical Power Engineering

Department Teaching the course: Mechanical Power Engineering
Academic year/ Level:
Date of specification approval: **2013**

A. Basic Information

Title:	Thermodynamics	**Code:**	MEP111
Credit Hours:	3	**Lecture:**	3
Tutorial:	1.5	**Lab:**	0
Total:	4.5		

B. Professional Information

1. Overall aims of course

By the end of the course the students will be able to:

- Identify energy transformation processes in thermal systems.
- Recognize and identify state points of thermal systems.
- Understand thermodynamic terminology such as process, path, cycle, internal energy, enthalpy, heat and work.
- Represent any process on p-v and T-v diagrams.
- Understand the first law of thermodynamics and its forms.
- Use Thermodynamic tables and EES software to determine state and properties of a substance.
- Understand the relation between different thermodynamic properties.
- Differentiate between open and closed systems, ideal and real gases, intensive and extensive properties.
- Apply the first law of thermodynamics on standard power cycles and its components.

2. Intended learning outcomes of course (ILOs)

a. Knowledge and Understanding

a1. Applications of the first law of thermodynamics.
a2. Understanding of energy forms.
a3. Definition of state, property and process.
a4. Differentiation between ideal and real gas.
a5. Differentiation between internal energy and enthalpy.
a6. Understanding the relation between different thermodynamic properties.

b. Intellectual Skills

b1. Analyze problems of thermal system.
b2. Identify different state points and processes of thermal systems.
b3. Perform energy balance on thermal systems. Define thermal losses and thermal efficiency.

c. Professional and Practical Skills

c1. Efficiently use tables and EES software to determine thermodynamic properties.
c2. Represent thermal system and associated processes on p-v or T-v diagram and calculate different state points.

d. General and Transferable Skills

d1. Effectively manage tasks and time.
d2. Get familiar with team-work environment.
d3. Develop the creative thinking and problem solving skills.

3. Contents

No	Course Content	Lecture (hours)	Tutorial (hours)	Total
1	Introduction and basic concepts ***(Chapter 1).***	3	1.5	4.5
2	Energy, energy transfer and energy analysis ***(Chapter 2).***	3	1.5	4.5
3	First law of thermodynamics ***(Chapter 2).***	3	1.5	4.5
4	Properties of pure substances: phase change, property diagrams, property tables, EES software and the ideal-gas equation of state ***(Chapter 3).***	6	3	9
5	Energy analysis of closed systems: energy balance, internal energy, enthalpy and specific heats ***(Chapter 4).***	9	4.5	13.5
6	Mass and energy analysis of control volumes: conservation of mass, flow work, energy analysis of steady-flow systems ***(Chapter 5).***	9	4.5	13.5
7	Thermodynamics' applications ***(Chapter 5).***	9	4.5	13.5
8	Simple-ideal power cycles ***(Chapter 9&10).***	3	1.5	4.5
	Total	**45**	**22.5**	**67.5**

4. Assessment schedule

Assessment method	Description	Week No	Weight (%)
Assignments	**At least three assignments to be given in the form of**	1 to 15	5
Quiz	**Three in-class quizzes. The lowest grade will be excluded.**	6, 8 and 10	5
Exam	**one midterm**	8	15
Participation	**Participation in class and tutorial sessions**	All weeks	5
Exam	**Final**	15	70
		Total	100

5. List of references

a. Essential books (text books)

- Yunus A. Cengel and Michael A. Boles, *"**Thermodynamics: an engineering approach**"*, 5th edition, New York: McGraw-Hill, ISBN 0-07-288495-9.

6. Facilities required for teaching and learning

- Board, whiteboard is recommended.
- Video projector.

Course Content/ILO Matrix

Course Content	a1	a2	a3	a4	a5	a6	b1	b2	b3	c1	c2	d1	d2	d3
Introduction and basic concepts			•					•						
Energy, energy transfer and energy analysis		•					•							
First law of thermodynamics	•						•		•		•		•	
Properties of pure substances: phase change, property diagrams, property tables, EES software and the ideal-gas equation of state				•		•		•		•	•	•		
Energy analysis of closed systems: energy balance, internal energy, enthalpy and specific heats	•	•	•		•		•	•	•	•	•			
Mass and energy analysis of control volumes: conservation of mass, flow work, energy analysis of steady-flow systems	•	•	•		•		•	•	•	•	•	•		
Thermodynamics' applications	•	•	•	•	•	•	•	•	•	•	•		•	
Simple-ideal power cycles	•	•	•	•	•	•	•	•	•	•		•		

Learning Method /ILO Matrix

Learning method	a1	a2	a3	a4	a5	a6	b1	b2	b3	c1	c2	d1	d2	d3
Lecture	•	•	•	•	•	•	•	•	•	•	•	•	•	
Tutorial	•		•		•	•	•	•	•	•	•	•	•	•

Assessment Methods /ILO Matrix

Assessment method	a1	a2	a3	a4	a5	a6	b1	b2	b3	c1	c2	d1	d2	d3
Assignments	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Quiz	•	•	•		•	•	•	•	•	•	•	•		•
Mid-term	•	•	•	•	•	•	•	•	•	•	•	•		•
Final	•	•	•	•	•	•	•	•	•	•	•	•		•

Course Coordinator: Dr. Walid Aboelsoud

Department chair: Prof. Mahmoud Kamal

Date: 20/09/2018

Course specifications of

Theory of Structures - CES 112

University: Ain Shams **Faculty: Engineering**

Program on which the course is given	B. SC. in B .Sc in all Mechanical Engineering
Department offering the program	All Mechanical Eng. (product, power, auto)
Department offering the course:	Structural Engineering department
Academic year/ Level:	2nd year – 1st Semester
Date of specification approval:	25/8/2012

A- Basic Information

Title :	Theory of Structures	**Code:**	CES-112		
Credit Hours :	N.A.	**Lecture :**	2		
Tutorial :	2	**Practical**	0	**Total:**	4

B- Professional Information

1 – Overall aims of course

By the end of the course the students will be able to:

- Determine of the Internal Forces Diagrams for the statically determinate structures (Beams-Frames-Trusses) under applied static loads.
- Determine of normal and shear stresses in homogeneous elastic bodies.

2- Intended learning outcomes of course (ILOs)

a-Knowledge and understanding

a1 - Provide students with basic concepts of structural systems.
a2 - Understand the behavior of structures.

b-Intellectual skills

b1 - Ability to define the engineering problems

c-Professional and practical skills

c1 - Prepare technical drafts and finished drawings manually, for internal force diagrams
c2 - Prepare technical drawings manually, for internal stress diagrams

d-General and transferable skills

d1 - Ability to share ideas and communicate with others

Course Coordinator: **Dr Mahmoud Hassan Ibrahim** Department Head: Prof. Dr. Amr Abdel Rahman

Signature:

3- Contents

No	Course Content	Lectures	Tutorials	Total	Instructor
1	Introduction to structure systems	2	2	4	Dr.Mahmoud
2	Types of loads and supports	2	2	4	
3	Determination of reactions in Beams, Frames, Trusses	2	2	4	
4	Stability of structures	2	2	4	
5	Determination of internal forces in Beams	2	2	4	
6	Determination of internal forces in (Trussed –beams)	2	2	4	
7	Determination of internal forces in Frames	2	2	4	
8	Determination of internal forces in Plane Trusses	2	2	4	
9	Properties of plan area	2	2	4	
10	Straining actions	2	2	4	
11	Normal stresses in homogeneous elastic bodies	2	2	4	
12	Shear stresses	2	2	4	
Total Hours		24	24	48	

Course Coordinator: **Dr Mahmoud Hassan Ibrahim** Department Head: Prof. Dr. Amr Abdel Rahman

Signature:

4- Assessment schedule

Assessment method	No	Description	Week No	Weight (%)
Exercise 1	1	Stability and Determinacy	Week 1	1
Exercise 2	2	Reactions and Link Forces	Week 2	2
Exercise 3	3	Internal Forces (Beams)	Week 3	2
Exercise 4	4	Internal Forces (Trussed -Beams)	Week 4	2
Exercise 5	5	Internal Forces (Frames)	Week 5	2
Exercise 6	6	Straining action in space	Week 6	1
Mid-Trem Examination	7	Stability .Reactions.Internal Forces	Week 7	14
Exercise 7	8	Trusses	Week 8	2
Exercise 8	9	Normal Sresses for Plane Structures	Week 10	2
Exercise 9	10	Normal Sresses for Spaces Structures	Week 12	2
Exercise 10	11	Shear Stress	Week 13	2
Final –term Examination	12	All.Subjects	Week 16	70
Total				100%

5- List of references

5. 1 Course notes

- Lecture notes

5. 2 Essential books (text books)

- ---- ---- ----

5. 3 Recommended books

- NA

5. 4 Periodicals, Web sites, … etc

- NA

Course Coordinator: **Dr Mahmoud Hassan Ibrahim** Department Head: Prof. Dr. Amr Abdel Rahman

Signature:

6- Facilities required for teaching and learning

- Structural Lab.

Course Content/ILO Matrix

Course Content	a 1	a 2	b 1	c 1	c 2	d 1
Introduction to structure systems	•	•				
Types loads and supports	•					
Determination of reactions in Beams,Frames Trusses			•			•
Stability of structures			•			
determination of internal forces in Beams			•	•	•	
determination of internal forces in Frames			•	•	•	
determination of internal forces in Plane Trusses				•	•	
Properties of plain area			•			
Straining actions			•		•	•
Normal stresses in homogeneous elastic bodies				•		•
Shear stersses			•		•	•

Learning Method /ILO Matrix

Learning Method	a 1	a 2	b 1	c 1	c 2	d 1
Lectures	•	•	•	•	•	•
Tutorials	•	•	•	•	•	•

Course Coordinator: **Dr Mahmoud Hassan Ibrahim** Department Head: Prof. Dr. Amr Abdel Rahman

Signature:

Assessment Methods /ILO Matrix

Assessment	a 1	a 2	b 1	c 1	c 2	d 1
Exercise 1 : Stability and Determinancy	•	•	•			•
Exercise 2 : Reactions and Link Forces			•			•
Exercise 3 : Internal Forces (Beams)			•	•	•	•
Exercise 4 : Internal Forces (Trussed – beams)			•	•	•	•
Exercise 5 : Internal Forces (Frames)				•	•	•
Exercise 6 : Staining action in Space						•
Mid –Term Examination : Stability ,Reactions .Internal Forces				•	•	
Exercise 7 :Trusses						•
Exercise 8 : Normal Stresses for plane Structures			•			•
Exercise 9 : Normal Stresses for Space Structures			•			•
Exercise 10 : Shear Stress				•	•	•
Final – term Examination : All Subjects				•	•	

Course Coordinator: **Dr Mahmoud Hassan Ibrahim** Department Head: Prof. Dr. Amr Abdel Rahman

Signature:

Course Coordinator:
Head of Department:
Date:

Course specificationsof

Electrical & Electronic Engineering - EPM 112pr2

University: Ain Shams **Faculty: Engineering**

Program on which the course is given	B.Sc. in Mechanical Power, Production, Automative and Mechatronics.
Major or minor element of program	N.A.
Department offering the program	B.Sc. in Mechanical Power, Production, Automotive and Mechatronics Departments
Department offering the course :	Electrical Power and Machines Eng.
Academic year/ Level :	2nd, Second semester
Date of specification approval :	23/01/2013

A- Basic Information

Title	Electrical & Electronic Engineering	**code :**	EPM-112
Credit Hours	N.A.	**Lecture :**	2
Tutorial : 1	**Practical** 0	**Total:** 3	

B- Professional Information

1 – Overall aims of course

This course aims to:

- Enrich the student knowledge about dc and ac circuit theories.
- Develops the student ability to solve dc and ac circuits.
- Train the student to solve circuit problems using readymade software (spice … etc.).

2- Intended learning outcomes of course (ILOs)

a-Knowledge and understanding

By the end of the course the student will be able to:

a1 - Recognize the voltage current characteristics of different and electronic circuit elements (passive and active)

a2 - Define the different theories that can be applied to electrical and electronic circuits.

a3 - Define the different types of energy storage elements.

a4- Recognize the differences between ac and dc circuits.

a5- Identify the meaning of active reactive and apparent powers.

Program Coordinator: Dr Mohamed Azzat

Head of Department: Prof. Dr. Hesham Temraz

Date: 23/01/2013

b-Intellectual skills

b1 - Applying the different theories to solve electrical circuits.
b2 - Construct circuits in complex domain starting from time domain.
b3 - Illustrates the differences between active , reactive and apparent powers.

c- Professional and practical skills

c1 – Solving circuits using electronic software.
c2 – Design circuit for specific application.

d- General and transferable skills

d1 - Self learning through report.

Bylaw 2003

Electrical engineering: Constants and variables of electrical circuits, Elements of electrical circuits, dc circuits, Network theorems, Sinusoidal alternating current circuits at steady state, Phasor diagram representation of sinusoidal quantities, Application of network theorems to alternating current circuits, Electric power in alternating current circuits, Power factor, Inductance.

3- Contents

No	Course Content	Class Lectures	Tutorials	Total
1	Basic Concepts	4	2	6
2	Basic circuit laws	4	2	6
3	Circuit analysis techniques	6	4	10
4	Electrical circuits theorems	4	2	6
5	Sinusoidal steady state analysis	6	2	8
6	AC power analysis	6	3	9
	Total	30	15	45

Program Coordinator: Dr Mohamed Azzat
Head of Department: Prof. Dr. Hesham Temraz
Date: 23/01/2013

4- Assessment schedule

Assessment method	No	Description	Week No	Weight (%)
Assignments and Quiz	1	Assignment 1	Week 2	5
Assignments and Quiz	2	Assignment 2	Week 4	5
Assignments and Quiz	3	Assignment 3	Week 6	5
Report	4	Reports	Week 7	10
Written Exam	5	Mid Term Exam	Week 8	15
Written Exam	6	Final Term Exam	Week 15	60
Total				100 %

5- List of references

5.1. **Course notes**

- Available

5.2. Essential books (text books)

- J. David Irwin & R. Mark Nelms, "Basic engineering Circuit Analysis", 10th Edition, John Wiley & Sons, 2011.
- James W. Nilsson, "Electric Circuits", 8th Edition, Pearso prentice Hall, 2008.
- Charles K. Alexander & Matthew N. O. Sadiku ," Fundamental of electrical circuits", 4th Edition, Mc Graw Hill, 2009.
- Introduction to Electric Circuits, 8th Edition by Richard C. Dorf & James A. Svoboda, 2010.

5.3. Recommended books

- ---- ---- ----

5.4. Periodicals, Web-sites, etc

- ---- ---- ----

6- Facilities required for teaching and learning

- Appropriate teaching class accommodations including presentation board and data show.

Program Coordinator: Dr Mohamed Azzat

Head of Department: Prof. Dr. Hesham Temraz

Date: 23/01/2013

Course Content/ILO Matrix

Course Content	a1	a2	a3	a4	a5	b1	b2	b3	c1	c2	d1
Basic concepts	•										
Basic circuit laws		•						•			
Circuit analysis technique		•	•	•			•	•	•	•	
Electrical circuits theorems		•				•	•				
Sinusoidal steady state analysis				•			•				
AC power analysis				•	•			•			

Learning Method /ILO Matrix

Learning Method	a1	a2	a3	a4	a5	b1	b2	b3	c1	c2	d1
Class Lectures	•	•	•	•	•	•	•	•	•		
Tutorials							•	•	•	•	•
Self learning										•	•

Assessment Methods /ILO Matrix

A	a1	a2	a3	a4	a5	b1	b2	b3	c1	c2	d1
Assignments and Quiz : Quiz 1	•	•				•		•			
Assignments and Quiz : Quiz 2	•	•	•			•					
Assignments and Quiz : Quiz 3				•	•		•				
Written Exam : Mid Term Exam	•	•	•	•	•	•					
Written Exam : Final Term Exam	•	•	•	•	•	•	•	•	•		
Report									•	•	•

Program Coordinator: Dr Mohamed Azzat
Head of Department: Prof. Dr. Hesham Temraz
Date: 23/01/2013

Course specificationsof

Electrical & Electronic Engineering - EPM 112pr2

University: Ain Shams **Faculty: Engineering**

Program on which the course is given	B.Sc. in Mechanical Power, Production, Automative and Mechatronics.
Major or minor element of program	N.A.
Department offering the program	B.Sc. in Mechanical Power, Production, Automotive and Mechatronics Departments
Department offering the course :	Electrical Power and Machines Eng.
Academic year/ Level :	2nd, Second semester
Date of specification approval :	23/01/2013

A- Basic Information

Title	Electrical & Electronic Engineering	**code :**	EPM-112
Credit Hours	N.A.	**Lecture :**	2

Tutorial : 1 **Practical** 0 **Total:** 3

B- Professional Information

1 – Overall aims of course

This course aims to:

- Enrich the student knowledge about dc and ac circuit theories.
- Develops the student ability to solve dc and ac circuits.
- Train the student to solve circuit problems using readymade software (spice … etc.).

2- Intended learning outcomes of course (ILOs)

a-Knowledge and understanding

By the end of the course the student will be able to:

a1 - Recognize the voltage current characteristics of different and electronic circuit elements (passive and active)

a2 - Define the different theories that can be applied to electrical and electronic circuits.

a3 - Define the different types of energy storage elements.

a4- Recognize the differences between ac and dc circuits.

a5- Identify the meaning of active reactive and apparent powers.

Program Coordinator: Dr Mohamed Azzat

Head of Department: Prof. Dr. Hesham Temraz

Date: 23/01/2013

b-Intellectual skills

b1 - Applying the different theories to solve electrical circuits.
b2 - Construct circuits in complex domain starting from time domain.
b3 - Illustrates the differences between active , reactive and apparent powers.

c- Professional and practical skills
c1 – Solving circuits using electronic software.
c2 – Design circuit for specific application.

d- General and transferable skills
d1 - Self learning through report.

Bylaw 2003

Electrical engineering: Constants and variables of electrical circuits, Elements of electrical circuits, dc circuits, Network theorems, Sinusoidal alternating current circuits at steady state, Phasor diagram representation of sinusoidal quantities, Application of network theorems to alternating current circuits, Electric power in alternating current circuits, Power factor, Inductance.

3- Contents

No	Course Content	Class Lectures	Tutorials	Total
1	Basic Concepts	4	2	6
2	Basic circuit laws	4	2	6
3	Circuit analysis techniques	6	4	10
4	Electrical circuits theorems	4	2	6
5	Sinusoidal steady state analysis	6	2	8
6	AC power analysis	6	3	9
	Total	30	15	45

Program Coordinator: Dr Mohamed Azzat
Head of Department: Prof. Dr. Hesham Temraz
Date: 23/01/2013

4- Assessment schedule

Assessment method	No	Description	Week No	Weight (%)
Assignments and Quiz	1	Assignment 1	Week 2	5
Assignments and Quiz	2	Assignment 2	Week 4	5
Assignments and Quiz	3	Assignment 3	Week 6	5
Report	4	Reports	Week 7	10
Written Exam	5	Mid Term Exam	Week 8	15
Written Exam	6	Final Term Exam	Week 15	60
Total				100 %

5- List of references

5.1. **Course notes**

- Available

5.2. Essential books (text books)

- J. David Irwin & R. Mark Nelms, "Basic engineering Circuit Analysis", 10th Edition, John Wiley & Sons, 2011.
- James W. Nilsson, "Electric Circuits", 8th Edition, Pearso prentice Hall, 2008.
- Charles K. Alexander & Matthew N. O. Sadiku ," Fundamental of electrical circuits", 4th Edition, Mc Graw Hill, 2009.
- Introduction to Electric Circuits, 8th Edition by Richard C. Dorf & James A. Svoboda, 2010.

5.3. Recommended books

- ---- ---- ----

5.4. Periodicals, Web-sites, etc

- ---- ---- ----

6- Facilities required for teaching and learning

- Appropriate teaching class accommodations including presentation board and data show.

Program Coordinator: Dr Mohamed Azzat

Head of Department: Prof. Dr. Hesham Temraz

Date: 23/01/2013

Course Content/ILO Matrix

Course Content	a1	a2	a3	a4	a5	b1	b2	b3	c1	c2	d1
Basic concepts	•										
Basic circuit laws		•						•			
Circuit analysis technique		•	•	•			•	•	•	•	
Electrical circuits theorems		•				•	•				
Sinusoidal steady state analysis				•			•				
AC power analysis				•	•			•			

Learning Method /ILO Matrix

Learning Method	a1	a2	a3	a4	a5	b1	b2	b3	c1	c2	d1
Class Lectures	•	•	•	•	•	•	•	•	•		
Tutorials							•	•	•	•	•
Self learning										•	•

Assessment Methods /ILO Matrix

A	a1	a2	a3	a4	a5	b1	b2	b3	c1	c2	d1
Assignments and Quiz : Quiz 1	•	•				•		•			
Assignments and Quiz : Quiz 2	•	•	•			•					
Assignments and Quiz : Quiz 3				•	•		•				
Written Exam : Mid Term Exam	•	•	•	•	•	•					
Written Exam : Final Term Exam	•	•	•	•	•	•	•	•	•		
Report									•	•	•

Program Coordinator: Dr Mohamed Azzat

Head of Department: Prof. Dr. Hesham Temraz

Date: 23/01/2013

Course Specifications of

Technical Report Writing – HUM X12

University: Ain Shams University **Faculty: Engineering**

Programme on which the course is given	B. Sc. in Mechanical Engineering
Major or minor element of programme	N.A.
Department offering the programme	Design and Production Engineering
Department offering the course	Design and Production Engineering
Academic year/ Level	first Year /second semester
Date of specification approval	

A- Basic Information

Title: Technical Report Writing **Code:** HUM X12
Credit Hours: N.A **Lecture:** 2
Tutorial: 1 **Practical:** 0
Total: 3

B- Professional Information

1- Overall Aims of the Course

This course aims to:

- Gather information and data.
- Choose suitable visual Aids.
- Use computer and construct tables, graphs and different visual Aids.
- Prepare, write and revise a report.
- Write a good paragraph.
- Learn how to do a presentation
- Learn how to apply for a job

2- Intended Learning Outcomes of the course (ILOs)

By completing this course successfully, the student will be able to:

a- Knowledge and Understanding

a1 –Identify the technical report contents.
a2 – Recognize the concept of paragraph writing.
a3 – Select suitable visual aids
a4- Learn how to do a presentation and listening to it

b- Intellectual Skills

b1 Prepare, organize, outlining and editing a report.
b2 – Practice how to write a paragraph.

c-Professional and practical skills

By completing this course successfully, the student will be able to:
c1- Prepare well written Report
c2- Learn how to write a resume

Course Coordinator: Dr.Tayseer Atia
Head of Department: Prof.Dr. Hesham Senbel
Date:

d- General and Transferable Skills

d1- Communicate ideas effectively

d2 - Work effectively in a team.

d3 - Present his work in an efficient way.

3- Contents

No	Course Content	Lecture	Tutorial	Total
1	Introduction to Technical Writing	2	1	3
2	Guidelines for writing noise free documents	4	2	6
3	Elimination of noise in sentences	4	2	6
4	Writing good paragraphs	2	1	3
5	Visual Aids	2	1	3
6	Ethic and documentation in Writing	2	1	3
7	Writing an Engineering Report	4	2	6
8	Common Engineering Reports	4	2	6
9	Engineering the presentation	2	1	3
10	Writing to get an engineering job	2	1	3
11	Reasoning with data	2	1	3
	Total Hours	30	15	45

4- Teaching and learning methods

4.1 – Class Lectures

4.2 - Tutorial

5- Student assessment methods

5.1 Technical paper and presentation.

5.2 Assignments.

5.3 Mid-Term Examination.

5.4 Final examination.

5.5 In-Class activities and attendance.

Assessment schedule

Assignments	Weekly
Technical paper and presentation	Weeks 4 and 10
Mid-Term Examination	8^{th} week
Final Exam	End of semester
In-Class activities and attendance	Weekly

Weighting of assessments

Technical paper and presentation	10%
Quizzes & assignments	20%
Mid-Term Examination	25%
In-Class activities & attendance	5%

Course Coordinator: Dr.Tayseer Atia

Head of Department: Prof.Dr. Hesham Senbel

Date:

Final Exam	40%
Total	100%

6- List of references

6.1 Course Notes

- Lecture handouts

6.2 Essential Books (Text Books)

- David Beer, and David McMurrey, A Guide to Writing as an Engineer, 3rd edition, John Wiley & Sons, Inc., 2009.

6.3 Recommended Books

-NA ---- ---- ----

6.4 Periodicals, Websites,… etc

- NA

7- Facilities Required for teaching and Learning

- Data show

Course Content/ILO Matrix

Course Content	a1	a2	a3	a4	b1	b2	C1	C2	d1	d2	d3
Introduction to Technical Writing	●										
Guidelines for writing noise free documents		●									
Elimination of noise in sentences			●			●					
Writing good paragraphs		●									
Visual Aids					●						
Ethic and documentation in Writing	●										
Writing an Engineering Report	●				●		●		●	●	●
Common Engineering Reports	●				●						
Engineering the presentations			●	●					●		●
Writing to get an engineering job								●			
Reasoning with data	●								●		

Course Coordinator: Dr.Tayseer Atia

Head of Department: Prof.Dr. Hesham Senbel

Date:

Learning Method/ILO Matrix

Learning Methods	a1	a2	a3	a4	b1	b2	C1	C2	d1	d2	d3
Lectures	●	●	●	●	●	●					
Tutorials				●	●	●	●	●	●	●	●

Assessment Methods/ILO Matrix

Assessment	a1	a2	a3	a4	b1	b2	C1	C2	d1	d2	d3
Quizzes &Assignment	●	●									
Midterm Exam	●	●	●			●					
Quiz									●	●	●
Report					●		●		●	●	●
Final Exam	●	●	●	●	●	●		●	●		●

Course Coordinator: Dr.Tayseer Atia
Head of Department: Prof.Dr. Hesham Senbel
Date:

Course specifications of

Manufacturing Technology (2) – MDP 211

University: Ain Shams **Faculty: Engineering**

Programme on which the course is given:	**All Mechanical Engineering Programmes**
Major or minor element of programme:	N. A.
Department offering the programme:	All mechanical engineering departments
Department offering the course:	Design and Production Engineering
Academic year/ Level:	2^{nd} year, second term
Date of specification approval:	

A- Basic Information

Title:	Manufacturing Technology (2)	**Code:**	MDP 211
Credit Hours:	**N.A.**	**Lecture:**	4
Tutorial :	1	**Practical:**	2
Total:	7		

B- Professional Information

1- Overall aims of course

By the end of the course the students will be able to:

- Get a basic idea of solidification and casting, alloys, structure and properties, casting products and applications,
- know about the different casting processes, mould and core-making, sand properties and testing, behavior of liquid metals, melting and melt treatment,
- Make design for a sound casting using basic equations and to specify the required moulding materials,
- Deal with casting quality control methods,
- Learn the basics of different traditional and innovative joining technologies,
- Get to know the correlation between materials behavior and joining technology and how to improve quality assurance in industrial manufacturing,
- Know the methods of testing the joints (strength, non-destructive testing, metallographic examination) are known,
- Design weld-joints for safe constructions.

2- Intended learning outcomes of course (ILOs)

a. Knowledge and understanding

a1- Get a basic idea of solidification and casting, alloys, structure and properties, casting products and applications.
a2- Explain different casting processes, mould and core-making, sand properties and testing, behavior of liquid metals, melting and melt treatment.
a3- State the design basics for a sound casting using basic equations, and to specify the required moulding materials.
a4- Learn the basics of different traditional and innovative joining technology.
a5- Know the correlation between materials behaviour and joining technology and how to improve quality assurance in industrial manufacturing.
a6- Know the different methods of testing the joints.

b. Intellectual skills

b1- Design a sound casting using basic equations.
b2- Design weld-joints for safe constructions.

c. Professional and practical skills

c1- Identify different casting processes, mould and core-making, sand properties and testing, behavior of liquid metals, melting and melt treatment.
c2- Deal with design of casting mould , and cores.
c3- Analyze the casting and predict the various casting defects.

d. General and transferable skills

d1- Make scientific Presentation by the casting project.
d2- Write technical reports about the advanced welding technology.
d3- Practice working in team in the casting project.

3- Contents

No	Course Content	Laboratory (hrs)	Lecture (hrs)	Tutorial (hrs)	Total (hrs)
1	Introduction to solidification and casting processes		2		2
2	Casting of wrought alloys, continuous casting		2		2
3	Principles of shaped casting, alloys & products, and processes		4		4

4	Sand, moulding and core-making processes	**2**	**4**	**3**	**9**
5	Liquid metal behaviour & fluid dynamics		**2**		**2**
6	Casting design, pattern, gating, feeding systems	**2**	**2**	**6**	**10**
7	Heat extraction & solidification		**4**	**3**	**7**
8	Melt treatment & melting equipment	**2**	**2**	**2**	**6**
9	Cast-iron	**2**	**2**		**4**
10	Casting defects & finishing	**2**	**2**	**2**	**6**
11	Quality control, environment, safety, computer application		**2**		**2**
12	Introduction to welding and joining principles		**4**		**4**
13	Classification of welding processes		**4**	**2**	**6**
14	Thermal welding: oxy-acetylene welding, arc welding, resistance welding, submerged arc welding, spot and seam welding, plasma	**2**	**12**	**4**	**18**
15	Cold welding: cold pressure welding, adhesive welding	**2**	**4**	**4**	**10**
16	Advanced welding		**2**		**2**
17	Design of weld joints and constructions		**2**		**2**
18	Testing of welded joints, welding defects and quality control	**1**	**2**		**3**
19	Casting project		**2**	**4**	**6**
	Total hours	**15**	**60**	**30**	**105**

Course Coordinator: Dr. Tarek Moussa

Head of Department: Prof. Dr. Hesham Senbel

Date: / /

4- Assessment schedule

Assessment method	No	Description	Week No	Weight
Reports		Reports	Weekly	10
Assignments		Assignments	Weekly	20
Written exam		Mid-term	Week 8	10
Oral exam		Discussion	Week 15	35
Written exam		Final exam	Week 16	100
Total				175

5- List of references

a. Course notes

-Laboratory manual provided by course instructors

-Notes distributed by the instructor

b. Essential books (text books)

-M. Lal – O. P. Khanna, 1979, Text Book of Foundry Technology,

-John Campell, Casting, 2nd edition, Butterworth-Heinemann 2003

-Killing, R. Welding Processes and Thermal Cutting, English Edition Band 1 (2001), 192 Seiten,

-265 Bilder, 40 Tabellen, ISBN:3-87155-790-0

- أحد سالم الصباغ، هندسة لحام المعادن، عالم الكتب، 1998

c. Recommended books

- أحمد سالم الصباغ، هندسة المواد – الجزء الثاني: الخواص الميكانيكية، عالم الكتب للنشر

- Radaj, D. Welding residual stresses and distortion calculation and measurement English

-Edition Band 2, (2003) 415 Seiten, 410 Abbildungen, ISBN: 3-87155-791-9

-Materials Handbook, v. 15 – casting, ASM Int., USA, 1998

d. Periodicals, Web sites, … etc

-Journal of Metals, ASM, USA

Course Coordinator: Dr. Tarek Moussa

Head of Department: Prof. Dr. Hesham Senbel

Date: / /

-Websites on casting and websites on welding.

6- Facilities required for teaching and learning

- Data show and computer and internet facilities,
- Laboratories for foundry, sand testing, and materials testing
- Text books, handbooks and standard specifications availability in student library

Course Content/ILO Matrix

Course Content	a1	a2	a3	a4	a5	a6	b1	b2	c1	c2	c3	d1	d2	d3
Introduction to solidification and casting processes	●													
Casting of wrought alloys, continuous casting		●	●											
Principles of shaped casting, alloys & products, and processes				●										
Sand, moulding and core-making processes		●	●		●									
Liquid metal behaviour & fluid dynamics						●			●					
Casting design, pattern, gating, feeding systems		●	●				●		●					
Heat extraction & solidification										●	●			
Melt treatment & melting equipment									●					
Cast-iron									●	●				
Casting defects & finishing									●	●				
Quality control, environment, safety, computer application											●			

Course Coordinator: Dr. Tarek Moussa

Head of Department: Prof. Dr. Hesham Senbel

Date: / /

Introduction to welding and joining principles							●	●						
Classification of welding processes							●							
Thermal welding: oxy-acetylene welding, arc welding, resistance welding, submerged arc welding, spot and seam welding, plasma						●								
Cold welding: cold pressure welding, adhesive welding						●		●						
Advanced welding									●					
Design of weld joints and constructions								●						
Testing of welded joints, welding defects and quality control							●	●					●	
Casting project												●	●	●

Learning Method /ILO Matrix

Course Content	a1	a2	a3	a4	a5	a6	b1	b2	c1	c2	c3	d1	d2	d3
Lecture	●	●	●	●	●	●		●						
Tutorial		●	●			●	●		●	●	●	●	●	●
Laboratory		●	●			●	●	●	●	●		●		●

Assessment Methods /ILO Matrix

Assessment	a1	a2	a3	a4	a5	a6	b1	b2	c1	c2	c3	d1	d2	d3
Reports:		●	●		●	●								
Assignments:	●	●	●	●	●	●	●							
Mid-term: midterm					●	●	●	●	●	●				
Oral: Exam												●	●	●
Written exam:	●	●	●	●	●	●	●			●	●			

Course Coordinator: Dr. Tarek Moussa

Head of Department: Prof. Dr. Hesham Senbel

Date: / /

Course specifications of

Stress Analysis–MDP 221

University: Ain Shams **Faculty: Engineering**

Programme on which the course is given:	B. Sc. in Mechanical Engineering
Major or minor element of programme:	NA
Department offering the programme:	Design and Production Engineering
Department offering the course:	Design and Production Engineering
Academic year/ Level:	Third Year/First Semester
Date of specification approval:	20/2/2016

A- Basic Information

Title:	Stress Analysis	**Code:**	MDP 221
Credit Hours:	NA	**Lecture:**	2
Tutorial:	2	**Practical:**	0
Total:	4		

B- Professional Information

1- Overall aims of course

By the end of the course the students will be able to:

- Understand and analyze the various loads and stresses acting on the mechanicalstructures.
- Analyze the internal forces for statically indeterminate beams.
- Determine the strains, deformations, slopes and deflections of the mechanical structures.

2- Intended learning outcomes of course (ILOs)

a. Knowledge and understanding

a1- Understand the various loads and stresses acting on the mechanical structures.
a2- Understand the internal forces for statically indeterminate beams.
a3 -Understand the strains, deformations, slopes and deflections of the mechanical structures.

b. Intellectual skills

b1- Analyze the various loads and stresses acting on the mechanical structures.
b2- Analyze the internal forces for statically indeterminate beams.
b3- Determine the strains, deformations, slopes and deflections of the mechanical structures

c. Professional and practical skills

c1- Deal with various mechanical systems.
c2-Utilize computer software's for determination of the critical sections in the mechanical structures.

d. General and transferable skills

d1-Deal with the Problems of fracture mechanics of the mechanical systems.
d2-Experience team work to submit projects utilizing computer software's.

3- Contents

No	Course Content	Lecture (hours)	Tutorial	Total
1	Properties of areas	2	2	4
2	Combined stresses and Mohr's circle	4	4	8
3	Theories of elastic failure	2	2	4
4	Transmission shafts	3	3	6
5	Slopes and deflections	3	3	6
6	Strains and Deformations	2	2	4
7	Statically indeterminate beams	2	2	4
8	Flexural analysis of curved beams	2	2	4
9	Thin shell pressure vessels	2	2	4
10	Thick cylinders	2	2	4
11	Buckling of compression members	2	2	4
12	Thermal stresses in bars, plates, pistons and cylinders	4	4	8
	Total	**30**	**30**	**60**

4- Assessment schedule

Assessment method	No	Description	Week No	Weight (%)
Assignments to assess ability to solve problems and analyze results independently.	1	Assignment 1	1	3
Assignments to assess ability to solve problems and analyze results	2	Assignment 2	3	3

Course Coordinator: Assoc. Prof. Dr. Wagdy El-Desouki Abdel-Ghany

Unit Head: Prof. Dr. Hesham Aly Senbel

Date: 20/2/2016

independently.				
Quiz	1	Quiz 1	4	3
Assignments to assess ability to solve problems and analyze results independently.	3	Assignment 3	5	2
Mid Term	1	Mid Term	8	5
Assignments to assess ability to solve problems and analyze results independently.	4	Assignment 4	9	3
Quiz	2	Quiz 2	10	3
Report	1	Report 1	11	2
Assignments to assess ability to solve problems and analyze results independently.	5	Assignment 5	12	3
Quiz	3	Quiz 3	13	3
Final Exam	1	Final Exam	15	70
Total				100 %

5- List of references

a. Course notes

-Stress data sheets.

b. Essential books (text books)

-Beer,F.B.&Johnston,E.R. "Mechanics of Materials" , McGraw-Hill Book Company, 1992.

-Popov,E.P., "Mechanics of Materials" , Prentice Hall Int., London, 1978.

c. Periodicals, Web sites, … etc

Different sites are selected by the students including text data, presentations and videos as necessary.

6- Facilities required for teaching and learning

Course Coordinator: Assoc. Prof. Dr. Wagdy El-Desouki Abdel-Ghany

Unit Head: Prof. Dr. Hesham Aly Senbel

Date: 20/2/2016

- Appropriateteaching equipmentincluding presentation board, data show and computer in lectures and tutorials.

Course Content/ILO Matrix

Course Content	a1	a2	a3	b1	b2	b3	c1	c2	d1	d2
Properties of areas	•								•	
Combined stresses and Mohr's circle	•	•								
Theories of elastic failure	•			•					•	
Transmission shafts				•					•	
Slopes and deflections		•				•				
Strains and Deformations		•	•		•		•	•		
Statically indeterminate beams										•
Flexural analysis of curved beams					•					
Thin shell pressure vessels				•				•		
Thick cylinders				•						•
Buckling of compression members						•		•		
Thermal stresses in bars, plates, pistons and cylinders				•		•				•

Learning Method /ILO Matrix

Learning Method	a1	a2	a3	b1	b2	b3	c1	c2	d1	d2
Lecture	•	•	•	•	•	•				
Tutorial				•	•	•	•	•	•	•

Assessment Methods /ILO Matrix

Course Content	a1	b1	b2	c1	c2	d1	d2
Assignment 1	•	•					
Assignment 2	•				•	•	
Assignment 3	•	•					
Assignment 4	•	•					
Assignment 5	•					•	
Quiz 1		•	•				
Quiz 2		•	•				
Quiz 3		•	•				
Mid term	•	•		•	•		
Report 1						•	•
Final exam	•	•			•	•	

Course Coordinator: Assoc. Prof. Dr. Wagdy El-Desouki Abdel-Ghany

Unit Head: Prof. Dr. Hesham Aly Senbel

Date: 20/2/2016

Course Specifications of

Mechanics of Machines (1) – MDP 251

University: Ain Shams **Faculty: Engineering**

Program(s) on which the course is given: Mechanical Engineering

Major or minor element of programs:

Department offering the program: Mechanical Engineering

Department offering the course: Design and Production EngineeringDep.

Academic year / Level: Second year Mechanical

Date of specification approval:

A- Basic Information

Title: Mechanics of Machines (1)

Code:MDP 251

Credit Hours: N/A

Lecture: 4 hr/week

Tutorial: 4 hr/week

Practical: --- ---

Total: 8 hr/week

B- Professional Information

1 – Overall aims of course

- To give students an appreciation of the fundamental principles, design andoperation of mechanical machines and mechanisms.
- To provide students with an understanding of the machines componentsutilized in conventional industrial systems.
- To describe the purpose and operation of mechanisms and its components.
- To demonstrate understanding of kinematics, dynamics of mechanisms.

- To analyzing any mechanism.
- To design a machine and specify mechanisms commonly used on equipment.

2 – Intended learning outcomes of course (ILOs)

By the end of the course students should have:

a- Knowledge and understanding:

The student is able to:

a_1- Define and explain of The importance of theory of machines in industrial.

a_2- Describe and define the fundamental concepts of: " chain", " links, joints, openkinematics chain, closed kinematics chain", " velocity, acceleration, and forceanalysis".

a_3- describe where the mechanisms are used.

b- Intellectual skills

The student is able to:

b_1- choose an appropriate suitable dimension for mechanism design.

b_2- conclude and developing innovative solutions for the practical mechanismsproblems for industrial applications.

c- Professional and practical skills

The student is able to:

c_1- diagnose the faults in mechanisms.

c_2- design and perform a mechanism for machine.

c_3- implement a practical mechanism.

d- General and transferable skills

The student is able to:

d_1- write of modern advanced report

d_2- train to retrieve information using Internet

d_3- present a communication skills through small groups (mini-projects)

3- Contents

Topic	No. of Hours	Lecture	Tutorial / Practical
1- Introduction, definition, and Basics ofmechanisms, Degrees of freedom, Types ofmechanisms	10	4	6/0
2- Inversions of reciprocating engine, Inversions of double slider mechanism	4	2	2/0
3- Motor vehicle steering mechanism	4	2	2/0
4- Hook's joint	4	2	2/0
5- Mechanisms Velocity Analysis	8	4	4/0
6- Mechanisms Acceleration Analysis, Analytical determination of kinematics ofpiston of engine mechanism.	10	6	4/0
7- Equilibrium of machines and force analysis: Static and power analysis, Friction and inertia-effect, Center of percussion,	12	6	6/0
8- Flywheel and turning moment diagram	4	2	2/0
9- Cams: Types of cams, Types of followers,Motion of followers, Cam profile andmotion of followers, dynamic analysis offollower forces (spring force).	16	8	8/0
10- Gears: Types of gears, Gear geometry andgear trains.	24	12	12/0
11- Balancing: Introduction, Balancing ofrotating masses, Balancing of the reciprocating engines and engine out ofbalance.	24	12	12/0
Total no. of hours for the course	**120**	**60**	**60/0**

4– Teaching and learning methods

4.1- Lectures supported by textbook.

4.2- Worked examples Question sheet

4.3- Assignment reports during the course

5- Student assessment methods

5.1 Mid Term Exam 1 to assess …1-4

5.2 Assessment 1 to assess … 1-3

5.3 Assessment 2 to assess … 4-8

5.4 Final Exam to assess … 1-8

Assessment schedule

Assessment 1…………………. Week …… 5……. first semester

Assessment 2 ………………… week ………14…... first semester

Weighting of assessments

Mid-term examination 15%

Final-term examination 70%

Oral examination ---

Practical examination ---

Semester work 15%

Other types of assessment ---

Total 100%

6- List of references

6.1- Course notes

- Lectures distributed during the course

6.2- Essential books (text books)

- Hannah, J., Mechanics of Machines, British Library, 1984.

6.3- Recommended books

- Mobie, H. H., Mechanics and Dynamics of Machinery, John Wiley and Sons, 1987.

6.4- Periodicals, Web sites, etc

- Mechanism and Machine Theory journal

http://www.elsevier.com/wps/find/journaldescription.cws_home/303/description#description

7- Facilities required for teaching and learning

- Computer Lab, Theory of machine Lab., data show, projector, ADAMS and MATLAB softwares.

Course Content/ILO Matrix

Course Content	a_1	a_2	a_3	b_1	b_2	c_1	c_2	c_3	d_1	d_2	d_3
1- Introduction, definition, and Basics of mechanisms, Degrees of freedom, Types of mechanisms	*	*	*	*			*			*	
2- Inversions of reciprocating engine, Inversions of double slider mechanism	*	*	*	*			*			*	
3- Motor vehicle steering mechanism		*	*	*			*			*	
4- Hook's joint		*	*	*			*			*	
5- Mechanisms Velocity Analysis	*	*								*	
6- Mechanisms Acceleration Analysis, Analytical determination of kinematics of piston of engine mechanism.		*								*	
7- Equilibrium of machines and force analysis: Static and power analysis, Friction and inertia-effect, Center of percussion,		*							*	*	*
8- Flywheel and turning moment diagram		*							*	*	*
9- Cams: Types of cams, Types of followers, Motion of followers, Cam profile and motion of followers, dynamic analysis of follower forces (spring force).	*				*			*	*	*	*
10- Gears: Types of gears, Gear geometry and gear trains.	*				*			*	*	*	*
11- Balancing: Introduction, Balancing of rotating masses, Balancing of the reciprocating engines and engine out of balance.	*					*			*	*	*

Learning Method/ILO Matrix

Learning Method	a_1	a_2	a_3	b_1	b_2	c_1	c_2	c_3	d_1	d_2	d_3
Lectures	*	*	*	*	*	*	*	*	*		
Question sheet		*	*	*	*	*	*	*			
Assignments									*	*	*

Assessment Methods/ILO Matrix

Assessment Method	a_1	a_2	a_3	b_1	b_2	c_1	c_2	c_3	d_1	d_2	d_3
Mid Term Exam	*	*	*	*	*	*	*	*			
Assessment									*	*	*
Final Exam	*	*	*	*	*	*	*	*			

Course specifications of

Machine Construction– MDP 252

University: Ain Shams **Faculty: Engineering**

Program on which the course is given:	All Mechanical Engineering Programs
Major or minor element of program :	N.A.
Department offering the program :	All Mechanical Engineering Departments
Department offering the course:	Design and Production Engineering
Academic year/ Level:	Second Year/Continuous course
Date of specification approval:	2014

A- Basic Information

Title:Machine Construction		**Code:**	MDP-252
Credit Hours:	**N.A.**	**Lecture:**	2
Tutorial :	2	**Practical:**	-
Total:	4		

B- Professional Information

1- Overall aims of course

By the end of the course the students will be able to:

- Demonstrate knowledge and understanding the basic considerations of machine construction and design
- Represent the different techniques of calculating the machine elements.
- Recognize and calculate the different methods of force analysis, stresses and deflection calculations during machine design.
- Formulate the stresses, deflections and rigidity during design calculations
- Solve using different techniques the design problems of mechanical joints
- Present the detailed workshop drawings and construct the different assemblies of machine elements.
- The student shall attain the aforementioned objectives efficiently under controlled guidance and supervision while gaining the experience through application and analysis and different case studies.

2- Intended learning outcomes of course (ILOs)

a. Knowledge and understanding

a1- Basic considerations of casting, forging and machining processes.
a2- Introduction of engineering materials.
a3- Fits and tolerance, surface roughness and geometrical tolerance.
a4- Margin and safety factors.

a5- Design of detachable joints and brackets.
a6- Pre-stressed bolted joints under static and dynamic loading.
a7- Pressure vessels.
a8- Riveted and welded joints.
a9- Power transmissions (threads and screws).
a10- Design and generation of shafts.
a11- Different key joints.
a12- Construction and design of couplings.
a13- Chains and wire ropes.
a14- Springs and elastic elements.
a15- Economy of machine design.
a16- Advanced programs of computer graphics.
a17- Conceptual design of machine elements.
a18- Design for manufacturing techniques.

b. Intellectual skills

b1- Recognize how to construct the machine drawings.
b2- Know how to check the stresses and deflections on the machine elements.
b3- How to construct the workshop drawings of mechanical elements.

c. Professional and practical skills

c1- Problem definition and mathematical simulations of machine elements.
c2- Deal with professional computer programs used for machine design.
c3- Analyze, the force, deflection and stress analysis of the different elements.

d. General and transferable skills

d1- Present and analysis the given problems.
d2- Write technical reports and conduct presentation about machine design.
d3- Extract the final drawings of the given problems.

3- Contents

No	Course Content	Lecture	Tutorial	Total
1	Basic considerations of different processes.	6	5	16
2	Introduction of engineering materials.	2	5	2
3	Fits and tolerance, surface roughness and geometrical tolerance	4	8	12

4	Margin and safety factors	4	4	8
5	Pre-stressed bolted joints under static and dynamic loading	6	8	14
6	Sealing	2	2	10
7	Riveted and welded joints	4	4	6
8	Power transmissions	4	4	4
9	Design of shafts and keys	5	6	8
10	Construction of couplings (flexible and rigid)	4	6	10
11	Project	3	5	6
12	Project	4	1	6
13	Project	6	1	4
14	Design for manufacturing / Project	6	-	4
	Total	60	60	120

4- Assessment schedule

Assessment method	No	Description	Week No	Weight (%)
Assessment	1	Assessment 1: Ex1 - Hoist Block	3	1
Assessment	2	Assessment 2: Sheet2-Concept to Design	4 & 5	2
Exam	3	Midterm Examination	6	2.5
Exam	4	Quiz 1: Basic Considerations	8	2.5
Assessment	5	Assessment 3: Force Analysis	9,10,and11	5
Assessment	6	Project choice and evaluation	20	-
Assessment	7	Report 1: net search on the product chosen standards	22	2

Course Coordinator: Prof. Tamer El Nady

Head of Department: Prof. Tamer El Nady

Date: 3 / 8 /**2017**

Exam		Quiz 2: Force Analysis	23	5
Exam	8	2nd Midterm exam	25	5
Assessment	9	Assessment 4: Project submissions	27	7.5
Assessment	10	Assessment 5: Project manufactured	28	7.5
Exam	11	Final exam	30	60
Total				100 %

5- List of references

a. Course notes

- ---- ---- ----

b. Essential books (text books)

c. Recommended books

- J.E. Shigly,"Mechanical Engineering Design",7th Edition, metric edition,McGRAW-HILL,2000.
- P. Orlove, "Fundamental of Machine Design", MIR Publisher, 1977.
- Abdulla Sheriff, “Design of Machine Elements", Dhanpat Rai &sons, 1990.

Periodicals, Web sites, etc:

- ---- ---- ----

6- Facilities required for teaching and learning

- Appropriate teaching class accommodations including presentation board and data show

Course Content/ILO Matrix

Course Content	a1	a2	a3	a4	b1	b2	b3	b4	c1	c2	c3	c4	d1	d2	d3	d4
Design For manufacture	●				●		●		●				●			
Design for assembly	●				●		●		●					●		
Developing and implementing DFX Tools	●				●	●	●		●						●	

Course Coordinator: Prof. Tamer El Nady

Head of Department: Prof. Tamer El Nady

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Design for dimensional Control		●			●	●	●					●				●
Design for inspect ability		●			●	●	●								●	
Design for reliability			●		●	●		●		●		●		●		
Design for Serviceability			●		●	●		●		●			●			
Design for disassembly evaluation for recycling			●		●	●		●		●		●		●		
Design for quality				●	●	●		●			●				●	
Design for optimal Environmental Impact				●	●	●		●				●				●
Design for optimization for product life cycle				●	●	●		●			●				●	
Design for technical Merit				●	●	●		●				●		●		

Learning Method /ILO Matrix

Course Content	a1	a2	a3	a4	b1	b2	b3	b4	c1	c2	c3	c4	d1	d2	d3	d4
Lecture	●	●	●	●												
Tutorial					●	●	●	●	●			●	●			
Lab, Software										●	●					
Seminar														●	●	●

Course Coordinator: Prof. Tamer El Nady

Head of Department: Prof. Tamer El Nady

Date: 3 / 8 /**2017**

Research															●	●

Assessment Methods /ILO Matrix

Assessment	a1	a2	a3	a4	b1	b2	b3	b4	c1	c2	c3	c4	d1	d2	d3	d4
Report 1	●				●								●		●	
Assignment 1		●			●	●				●		●				
Quiz 1	●	●				●				●						
Midterm Examination	●	●			●	●				●						
Oral Seminar							●	●	●		●	●		●		●
Assignment 2			●					●	●	●						
Quiz 2			●	●				●		●						
Assignment 3	●	●				●				●	●	●				
Assignment 4	●			●	●				●		●	●				
Final Term Examination	●	●	●	●												

Course Coordinator: Prof. Tamer El Nady

Head of Department: Prof. Tamer El Nady

Date: 3 / 8 /**2017**

Course specifications of

Thermodynamics II – MEP212

University: Ain Shams **Faculty: Engineering**

Program on which the course is given: Mechanical Engineering
Major or minor element of program: Major
Department offering the program: Mechanical Power Engineering

Department Teaching the course: Mechanical Power Engineering
Academic year/ Level:
Date of specification approval:

A. Basic Information

Title:	Thermodynamics	**Code:**	MEP212
Credit Hours:		**Lecture:**	4
Tutorial:	4	**Lab:**	0
Total:	8		

A. Professional Information

1. Overall aims of course

By the end of the course the students will be able to:

- Demonstrate knowledge of the second law of thermodynamics.
- Understand the concepts of entropy analysis.
- Show clear understanding of the irreversibility and entropy generation.
- Perform exergy analysis of thermodynamic systems.
- Analyze thermodynamic cycles from the point of view of the first law of thermodynamics as well as the second laws of thermodynamics.

2. Intended learning outcomes of course (ILOs)

a. Knowledge and Understanding

a1. Understanding of the second law of thermodynamics.
a2. Understanding of Carnot cycle and the second law efficiency.
a3. Understanding of irreversibility, entropy and exergy.
a4. Definition of entropy generation and exergy destruction.
a5. Differentiation between first and second law analysis.
a6. Application of the second law of thermodynamics.

b. Intellectual Skills

b1. Calculate entropy generation and exergy destruction.
b2. Identify irreversibility sources in thermodynamic systems.
b3. Perform entropy and exergy balance on systems.

c. Professional and Practical Skills

c1. Identify the second law efficiency of systems.
c2. Represent thermodynamic system and associated processes on T-s diagram and calculate thermodynamic properties at each state.

d. General and Transferable Skills

d1. Effectively manage tasks and time.
d2. Get familiar with team-work environment.
d3. Develop the creative thinking and problem solving skills.

3. Contents

No	Course Content	Lecture (hours)	Tutorial (hours)	Total
1	Review of the first law of thermodynamics.	4	4	16
2	The Second law of thermodynamics, Carnot efficiency and COP calculation of heat engines and heat pumps	12	12	24
3	Clausius inequality and the definition of entropy.	8	8	16
4	Entropy generation principle.	12	12	24
5	Exergy destruction principle and the second law efficiency.	12	12	24
6	Second law analysis of thermodynamic cycles.	12	12	24
	Total	**60**	**60**	**120**

4. Assessment schedule

Assessment method	Description	Week No	Weight (%)
Oral	**Oral examination**	1 to 15	40
Exam	**one midterm**	8	20
Project	**Project**	6 to 15	10
Participation	**Participation in class and tutorial sessions**	All weeks	10
Exam	**Final**	15	120
		Total	200

5. List of references

a. Essential books (text books)

- Yunus A. Cengel and Michael A. Boles, *"Thermodynamics: an engineering approach"*, 5th edition, New York: McGraw-Hill, ISBN 0-07-288495-9, 2006.
- Borgnakke, Claus, and Richard E. Sonntag, "*Fundamentals of Thermodynamics*", Wiley Global Education, 8th edition, 2016. ISBN-13: 978-1118131992.

6. Facilities required for teaching and learning

- Board, whiteboard is recommended.
- Video projector.

Course Content/ILO Matrix

Course Content	a1	a2	a3	a4	a5	a6	b1	b2	b3	c1	c2	d1	d2	d3
Review of the first law of thermodynamics.					•	•								
The Second law of thermodynamics, Carnot efficiency and COP calculation of heat engines and heat pumps.	•	•			•	•				•				
Clausius inequality and the definition of entropy.			•	•			•							
Entropy generation principle.			•	•			•	•	•					
Exergy destruction principle and the second law efficiency.			•	•	•		•	•	•					
Second law analysis of thermodynamic cycles.					•	•	•	•	•	•	•			

Learning Method /ILO Matrix

Learning method	a1	a2	a3	a4	a5	a6	b1	b2	b3	c1	c2	d1	d2	d3
Lecture	•	•	•	•	•	•	•	•	•	•	•			
Tutorial	•	•	•	•	•	•	•	•	•	•	•	•	•	•

Assessment Methods /ILO Matrix

Assessment method	a1	a2	a3	a4	a5	a6	b1	b2	b3	c1	c2	d1	d2	d3
Oral	•	•	•	•	•	•	•	•	•	•	•	•		•
Project	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Mid-term	•	•				•				•		•		•
Final	•	•	•	•	•	•	•	•	•	•	•	•		•

Course Coordinator: Dr. Nashwa Abbas & Dr. Walid Aboelsoud
Department Head: Prof. Mahmoud Kamal
Date: 30/04/2018

Course specifications of

Heat Transfer – MEP 221

University: Ain Shams **Faculty: Engineering**

Program on which the course is given:	Mechanical Power Engineering Department
Major or minor element of program :	N/A
Department offering the program :	Mechanical Power Engineering Department
Department Teaching the course:	Mechanical Power Engineering Department
Academic year/ Level:	Pre-Junior Students – Spring 2015
Date of specification approval:	Feb. 12, 2015

A. Basic Information

Title:	Heat Transfer	**Code:**	MEP 221
Credit Hours:	3	**Lecture:**	3
Tutorial :	2	**Lab:**	0
Total:	5		

B. Professional Information

1. Overall aims of course

By the end of the course the students will be able to:

- Define the basic terms of heat transfer.
- Understand the different modes of heat transfer.
- Use the properties of different substances in solving heat transfer problems.
- Differentiate between steady and transient conduction in solids.
- Analyze the energy flow for different heat exchangers.
- Evaluate the radiation heat transfer processes.

2. Intended learning outcomes of course (ILOs)

a. Knowledge and Understanding

a1. List heat transfer definitions and terminology.

a2. Summarize the different principles of heat transfer by conduction within various bodies.
a3. Explain the ways of heat transfer by convection energy transfer from surfaces to fluids.
a4. Identify components and elements of heat transfer machines they shall encounter in industrial installations.
a5. Recognize the actual applications and uses of heat exchangers.
a6. Understand principles of heat transfer by radiation for various geometries.

b. Intellectual Skills

b1. Analyze steady state heat transfer problems; conduction, convection, and radiation.
b2. Solve unsteady state conduction heat transfer problems.
b3. Select the appropriate model for transient conduction.
b4. Compare between forced and natural convection, laminar and turbulent flow, and developing flow and fully developed flow in the entrance region.
b5. Evaluate the performance of heat exchangers.

c. Professional and Practical Skills

c1. Select appropriate charts, tables, and software package (solver) to calculate heat transfer properties.
c2. Calculate correctly the coefficient for each transfer process.
c3. Design different type of heat exchangers.

d. General and Transferable Skills

d1. Present reports, discuss results and defend his/her ideas
d2. Conduct presentation about heat transfer problems in accordance with standard scientific guidelines
d3. Develop the creative thinking and problem solving skills.

3. Contents

No	Course Content	Lecture (hours)	Tutorial	Total
1	Introduction, definitions, and basic concepts	6	3	9
2	Application of the laws of conduction, convection and radiation to problems in heat transfer	12	9	21
3	Steady and transient conduction in solids	6	4	10
4	Laminar and turbulent convection.	9	6	15
5	Radiation heat transfer processes.	6	4	10
6	Heat exchangers.	6	4	10
	Total	45	30	75

4. Assessment schedule

Assessment method	Description	Week No	Weight (%)
Assignments	Assignment 1 – 5	3-14	15
Quiz	Quiz 1 (Unannounced)	-	5
Quiz	Quiz 2 (Unannounced)	-	5
Written Exam	Midterm 1	6	15
Written Exam	Midterm 2	11	15
Participation	Participation in class	1-15	5
Written Exam	Final Exam	16	40
		Total	100%

5. List of references

a. Essential books (text books)

- Fundamentals of heat and mass transfer, 6th ed." by Incropera and DeWitt, Wiley, 2006.

b. Periodicals, Web sites, … etc

- Handout content of the course prepared by the author of the course.

6. Facilities required for teaching and learning

- Suitable teaching room with whiteboard
- A PC with over head projector
- Heat transfer lab provided with teaching equipments.

Course Content/ILO Matrix

Course Coordinator: Dr. Yaser Fangary

Unit Head:

Programs Director:

Date:

Course Content	a1	a2	a3	a4	a5	a6	b1	b2	b3	b4	b5	c1	c2	c3	d1	d2	d3
Introduction, definitions, and basic concepts	•	•	•			•	•			•		•	•				
Application of the laws of conduction, convection and radiation to problems in heat transfer		•	•	•	•		•					•	•		•	•	•
Steady and transient conduction in solids	•	•		•			•	•	•			•	•		•	•	•
Laminar and turbulent convection.	•			•			•			•		•	•		•	•	•
Radiation heat transfer processes.	•			•		•	•					•			•	•	•
Heat exchangers.	•			•	•					•	•	•	•	•	•	•	•

Learning Method /ILO Matrix

Course Content	a1	a2	a3	a4	a5	a6	b1	b2	b3	b4	b5	c1	c2	c3	d1	d2	d3
Lectures	•	•	•	•	•	•	•	•	•		•		•	•	•		
Tutorials/Labs	•	•	•	•	•		•	•	•	•	•	•	•	•	•	•	•

Assessment Methods /ILO Matrix

Course Content	a1	a2	a3	a4	a5	a6	b1	b2	b3	b4	b5	c1	c2	c3	d1	d2	d3
Assignments 3-14	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Quiz 1	•	•					•	•				•					
Midterm 1	•	•	•				•	•		•		•	•				
Quiz 2	•	•	•	•	•		•	•	•	•		•	•				
Midterm 2	•	•	•	•	•	•	•	•	•	•	•	•	•	•			
Final Exam	•	•	•	•	•	•	•	•	•	•	•	•	•	•			

Course Coordinator: Dr. Yaser Fangary

Unit Head:

Programs Director:

Date:

Course specifications of

Fluid Dynamics - MEP 231

University: Ain Shams **Faculty: Engineering**

Programme on which the course is given	Mechanical power, Automotive and production eng.
Major or minor element of programme	N.A.
Department offering the programme	Mechanical power, Automotive and production eng.
Department offering the course :	Mechanical power engineering
Academic year/ Level :	Third year, First Semester.
Date of specification approval :	16/09/2017

A- Basic Information

Title :	Fluid Dynamics	**code :**	MEP-231
Credit Hours :	N.A.	**Lecture :**	4
Tutorial :	2	**Practical**	**Total:** 6

1 – Overall aims of course:

By the end of the course the students will be able to:

- Demonstrate knowledge of incompressible and compressible fluid flows, fluid statics, kinematics of flows and essential basic hydrodynamics.
- Define and solve problems in fluid dynamics in various engineering applications
- Predict necessary fluid parameters of full scale projects by performing simple model experiments.
- Share ideas and work in a team in an efficient and effective manner under controlled supervision or independently.

2- Intended learning outcomes of course (ILOs)

a-Knowledge and understanding

a1 - Define fluid properties, stresses in fluids at rest and in motion and types of fluid flows

a2 - Derive the governing equations of fluid flow: continuity,energy and momentum equations from principles of mass, energy and momentum conservation

a3 - Define the terms of Bernoulli's equation, include major and minor losses and draw the energy and the hydraulic gradient lines for flow systems

a4 - Descibe and explain velocity and flow measuring devices, boundary layers, separation, friction and form drag, lift and circulation and occurrence of the problem of cavitation

a5 - Explain the flow of compressible fluids and occurrence of shock waves. Also, xplain,solve and trace inviscid flow

Course Coordinator: Prof. Dr. Mohamed A El-Samanoudy

Head of Department: Prof. Dr. Mahmoud Mohamed Kamal

Date: 16 /9 /17

b-Intellectual skills

- b1 - Analyze problems Conclude
- b2 - solutions Demonstrate creative
- b3 - thinking

c-Professional and practical skills

- c1 - Use appropriate fluid measurement lab equipment
- c2 - Design and perform experiments in the lab and field within proper technical, safety and ethical framework

d-General and transferable skills

- d1 - Write reports in accordance with the standard scientific guidelines
- d2 - Present reports, discuss results and defend his/her ideas
- d3 - Work coherently and successfully as a part of a team in assignments

3- Contents

Total	Tutorials and discussion	Lectures	Laboratories	Course Content	No
6	2	4		Fundamental concepts: Definition of a fluid, Dimensions and units. Fluid Properties	1
12	4	8		Fluid Statics: Pressure and pressure measurements, Hydraulic forces on submerged surfaces. Rotating containers	2
12	4	6	2	Basic Equations of Fluid Mechanics: kinematics of flow , control volume approach, continuity, momentum, energy and Bernoulli's Eqs. Experiment :"effect of momentum change"	3
6	2	4		Dimensional Analysis and Dynamic Similitude: dimensional homogeneity. Buckingham method, similitude	4
16	2	10	4	Flow in Closed Conduits: laminar and turbulent flows, equation of motion, primary and minor losses, hydraulic and energy gradient lines. Experiments: "Pitot tube velocity survey in a pipe" and "Primary and secondary losses in pipes"	5
12	2	8	2	Compressible Flow: sonic velocity and Mach number, stagnation properties and isentropic flow ,flow through ducts of varying area, convergent and convergent-divergent nozzles, shock waves. Experiment: "Sonic and supersonic air flow".	6
10	2	8		Flow Over Immersed Bodies: Boundary layer growth and separation , drag on various two dimensional bodies, lift on airfoils	7

3- Contents

Total	Tutorials and discussion	Lectures	Laboratories	Course Content	No
10	2	8		Inviscid flow : Navier Stokes equations, stream function and velocity potential. Laplace equation and various flow fields, superposition of flows, flow around circular cylinder and airfoil	8
84	20	56	8	Total Hours	

4- Assessment schedule

Weight (%)	Week No	Description	No	Assessment method
10	Week 5	Assignment	1	First Assignment
20	Week 8	Written Exam	2	Mid Term Exam
30	Week 11	Assignment	3	Second Assignment
90	Week 14	Oral	4	Oral Exam
150	Week 15	Written Exam	5	Final Written Exam
300 %	Total			

5- List of references

5. 1 Essential books (text books)

- Bruce R. Munson, Donald Young and Theodore H. Okiishi "Fundamentals of Fluid Mechanics" , Fifth Edition, John Wiley & Sons Inc., 2006.

5. 2 Recommended books

- Streeter, V.L., Wylie, E, B., and Bedford, K. W., " Fluid Mechanics " Ninth Edition , McGraw Hill, N.Y.,2005.
Frank M. White, "Fluid Mechanics" Third Edition, McGraw Hill Inc.,2010
Philip M. Gerhard, Richard J Gross and John I. Hochstein, "Fundamentals

5. 3 Periodicals, Web sites, … etc

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6- Facilities required for teaching and learning

- Computers
- Laboratories
- Laboratory equipments
- Teaching Aids(Presentation board, overhead projector, data show)

Course Coordinator: Prof. Dr. Mohamed A El-Samanoudy
Head of Department: Prof. Dr. Mahmoud Mohamed Kamal
Date: 16 /9 /17

Course Content/ILO Matrix

Course Content	a1	a2	a3	a4	a5	b1	b2	b3	c1	c2	d1	d2	d3
Fundamental concepts: Definition of a fluid, Dimensions and units. Fluid Properties	•					•			•		•	•	
Fluid Statics: Pressure and pressure measurements, Hydraulic forces on submerged surfaces. Rotating containers	•	•				•	•		•		•	•	
Basic Equations of Fluid Mechanics: kinematics of flow , control volume approach, continuity, momentum, energy and Bernoulli's Eqs. Experiment :"effect of momentum change"		•	•			•	•		•	•	•	•	•
Dimensional Analysis and Dynamic Similitude: dimensional homogeneity. Buckingham method, similitude				•			•	•		•	•	•	•
Flow in Closed Conduits: laminar and turbulent flows, equation of motion, primary and minor losses, hydraulic and energy gradient lines. Experiments: "Pitot tube velocity survey in a pipe" and "Primary and secondary losses in pipes"		•	•	•		•	•	•	•	•	•	•	•
Compressible Flow: sonic velocity and Mach number, stagnation properties and isentropic flow ,flow through ducts of varying area, convergent and convergent-divergent nozzles, shock waves. Experiment: "Sonic and supersonic air flow".				•	•	•	•		•	•	•	•	•
Flow Over Immersed Bodies: Boundary layer growth and separation , drag on various two dimensional bodies, lift on airfoils			•	•			•	•	•		•	•	•

Course Coordinator: Prof. Dr. Mohamed A El-Samanoudy

Head of Department: Prof. Dr. Mahmoud Mohamed Kamal

Date: 16 /9 /17

Course Content/ILO Matrix

Course Content	a1	a2	a3	a4	a5	b1	b2	b3	c1	c2	d1	d2	d3
Inviscid flow : Navier Stokes equations, stream function and velocity potential. Laplace equation and various flow fields, superposition of flows, flow around circular cylinder and airfoil		•		•				•	•	•	•	•	•

Learning Method /ILO Matrix

Learning Method	a1	a2	a3	a4	a5	b1	b2	b3	c1	c2	d1	d2	d3
Lectures	•	•	•	•	•	•	•	•	•	•	•	•	•
Tutorials and discussion sessions	•	•	•	•	•	•	•	•	•	•	•	•	•
Laboratories		•	•	•	•	•	•	•	•	•	•	•	•

Assessment Methods /ILO Matrix

Assessment	a1	a2	a3	a4	a5	b1	b2	b3	c1	c2	d1	d2	d3
First Assignment : Assignment	•	•	•	•	•								
Mid Term Exam : Written Exam	•	•	•	•	•	•	•	•					
Second Assignment : Assignment											•	•	•
Oral Exam : Oral	•	•	•	•	•				•	•			

Course Coordinator: Prof. Dr. Mohamed A El-Samanoudy
Head of Department: Prof. Dr. Mahmoud Mohamed Kamal
Date: 16 /9 /17

Course Coordinator: Prof. Dr. Mohamed A El-Samanoudy
Head of Department: Prof. Dr. Mahmoud Mohamed Kamal
Date: 16 /9 /17

Course specifications of

Measurements - MEP 281

University: Ain Shams | Faculty: Engineering

Programme on which the course is given	Mechanical power, Automotive, Production and Mechatronic Engineering.
Major or minor element of programme	N.A.
Department offering the programme	Mechanical power, Automotive, Production and Mechatronic Engineering.
Department offering the course :	Mechanical power engineering
Academic year/ Level :	Third year
Date of specification approval :	1/2/2018

A- Basic Information

Title :	Measurements	code :	MEP-281		
Credit Hours :	N.A.	Lecture :	3		
Tutorial :	0	Practical	2	Total:	5

B- Professional Information

1 – Overall aims of course

By the end of the course the students will be able to:

- Practice knowledge of the concepts of calibration of measuring instruments.
- Demonstrate knowledge and understanding of different measuring systems.
- Show knowledge of the performance characteristics of measuring instruments and error estimation .
- Use and employ appropriate instrumentation to measure various fluid parameters such as : pressure, flow, velocity and temperature as well as force, stress, and strain and make the necessary analysis of combustion gases.

2- Intended learning outcomes of course (ILOs)

a-Knowledge and understanding

a1 - Define the sources of various errors, perform calibration and explain the performance characteristics of measuring instruments.

a2 - Outline and describe different measuring instruments used to measure pressure, flow, velocity, temperature, forces, stresses and strain and to to analyze the products of combustion gases.

a3 - Interpret different techniques employed by various instruments.

a4 - Describe the selection criteria between different measuring instruments.

b-Intellectual skills

b1 - Analyze the theory of operation of different measuring devices.

b2 - Differentiate between various methods for measuring fluid parameters.

c-Professional and practical skills

c1 - Employ an appropriate measuring device and necessary lab equipments

c2 - Demonstrate and perform experiments in the lab and field within proper technical, safety and ethical framework.

c3 - Analyze and estimate errors produced from different measuring devices.

d-General and transferable skills

d1 - Evaluate reports in accordance with the standard scientific guidelines.

d2 - Asses and perform experiments.

d3 - Score and work efficiently within a team.

3- Contents

Total	Lectures_	Lab_ Experiments_	Course Content	No
12	10	2	Performance Characteristics of measuring instruments: calibration, fixed and random errors, error estimation, sensitivity, linearity, dynamic characteristics. .Experiment (1): Statistical analysis of errors. experiment (1):Probability Analysis of Scattered data	1
14	10	4	Pressure Measurements: mechanical pressure transducers, manometers, elastic pressure measurements, electrical pressure transducers, inductive transducers, piezo-electric transducer, strain gauges. Experiments (2,3): Calibration of pressure measuring device	2
14	10	4	Flow Measurements: orifice nozzles, venturi, turbine flow meters, magnetic flow meters, rota-meters, positive displacement flow meters, ultrasonic meters. Experiments (4,5): Calibrating Different Kinds of flow Meters Fitted on an Experimental flow bench.	3
9	7	2	Velocity measurements: Pitot tube, laser Doppler velocimetry, hot wire anemometer. Experiment (6):Pitot tube velocity survey on a air flow pipe cross-section.	4
14	10	4	Temperature Measurements: Thermal expansion thermometers, bimetallic expansion, resistance thermometers, semi conductor thermometers, thermocouples, thermal radiation thermometers. Experiments(7,8): Performance comparison of various temperature measuring d	5

4- Assessment schedule

Weight (%)	Week No	Description	No	Assessment method
4	Week 2	Experiment(1) Statistical analysis of errors.	1	Reports
4	Week 3	Experiment (2)Pressure measurements	2	Reports
3	Week 4	Experiment (3)pressure measurements	3	Reports
4	Week 5	Experiment(4) Flow measurements	4	Reports
4	Week 6	Experiment(5) Flow measurements	5	Reports
4	Week 8	Experiment(6) Pitot-tube velocity survey	6	Reports
3	Week 10	Experiment(7) Temperature measurements	7	Reports
4	Week 11	Experiment(8) Temperature measurements	8	Reports
10	Week 13	Oral exam	9	Oral Exam
60	Week 15	Written exam	10	Final Exam
100 %	Total			

Course Coordinator: Prof. Dr. Mohamed A El-Samanoudy
Head of Department: Prof. Dr. M.Kamal
Date: / /

5- List of references

5.1 Course notes

- Lecture and Experiments Notes: To be handed to the students in parts.

5.2 Essential books (text books)

Holman, J.P., "Experimental Methods for Engineers", McGraw Hill, 1990.

5.3 Recommended books

Sawhney, A.K.," A Course in Mechanical Measurements and Instrumentation", Dhanpat and Sons, Delhi, 1989.
Doebelin, Erest O.," Measurements Systems Application and Design", McGraw Hill, 1990.

5.4 Periodicals, Web sites, … etc

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6- Facilities required for teaching and learning

- Computers
- Laboratories
- Laboratory equipments and measurement instrumentations.
- Teaching Aids(Presentation board, overhead projector, data show)

Course Coordinator: Prof. Dr. Mohamed A El-Samanoudy
Head of Department: Prof. Dr. M.Kamal
Date: / /

Course Content/ILO Matrix

d3	d2	d1	c3	c2	c1	b2	b1	a4	a3	a2	a1	Course Content
		•				•			•	•	•	Performance Characteristics of measuring instruments: calibration, fixed and random errors, error estimation, sensitivity, linearity, dynamic characteristics. Experiment (1): Statistical analysis of errors. Experiment (1):Probability Analysis of Scattered data
	•	•			•	•		•	•	•	•	Pressure Measurements: mechanical pressure transducers, manometers, elastic pressure measurements, electrical pressure transducers, inductive transducers, piezo electric transducer, strain gauges. Experiments (2,3): Calibration of pressure measuring device
	•	•	•			•	•		•	•		Flow Measurements: orifice nozzles, venturi, turbine flow meters, magnetic flow meters, rota-meters, positive displacement flow meters, ultrasonic meters. Experiments (4,5): Calibrating Different Kinds of flow Meters Fitted on an Experimental flow bench.
	•	•	•		•		•	•		•		Velocity measurements: Pitot tube, laser Doppler velocimetry, hot wire anemometer. Experiment (6):Pitot tube velocity survey on a air flow pipe cross-section.
•	•		•		•	•	•		•	•	•	Temperature Measurements: Thermal expansion thermometers, bimetallic expansion, resistance thermometers, semi conductor thermometers, thermocouples, thermal radiation thermometers. Experiments(7,8): Performance comparison of various temperature measuring d

Course Coordinator: Prof. Dr. Mohamed A El-Samanoudy
Head of Department: Prof. Dr. M.Kamal
Date: / /

Course Content/ILO Matrix

d3	d2	d1	c3	c2	c1	b2	b1	a4	a3	a2	a1	Course Content
•			•			•			•			Analysis of Combustion Products: props, sample condition, gas analysis, equipments for measuring O2, CO, CO2, UHC, Nox and Sox, Gas chromatography. Experiment (9): Using the Orsat Apparatus to Analyze the Products of Combustion Gases Products.
	•	•		•			•	•	•			Force Measurements: weights and springs, calibrating rings, strain and deflection measurements.
•		•	•				•	•		•		Strain and Stress Measurements: load cells , strain gauges.

Learning Method /ILO Matrix

d3	d2	d1	c3	c2	c1	b2	b1	a4	a3	a2	a1	Learning Method
•	•	•	•	•	•	•	•	•	•	•	•	Lectures.
•	•	•	•		•	•	•	•	•	•	•	Lab. Experiments.

Course Coordinator: Prof. Dr. Mohamed A El-Samanoudy
Head of Department: Prof. Dr. M.Kamal
Date: / /

Assessment Methods /ILO Matrix

Assessment	a1	a2	a3	a4	b1	b2	c1	c2	c3	d1	d2	d3
Reports : Experiment(1) Statistical analysis of errors.	•			•	•			•	•			•
Reports : Experiment (2)Pressure measurements		•		•	•		•					•
Reports : Experiment (3)pressure measurements	•		•	•	•						•	
Reports : Experiment(4) Flow measurements		•	•			•		•	•			•
Reports : Experiment(5) Flow measurements	•		•		•		•	•		•		•
Reports : Experiment(6) Pitot-tube velocity survey			•	•	•		•		•			•
Reports : Experiment(7) Temperature measurements	•	•		•		•		•		•		
Reports : Experiment(8) Temperature measurements		•	•		•		•				•	•
Oral Exam : Oral exam			•	•	•			•		•	•	
Final Exam : Written exam	•	•	•		•	•	•		•	•	•	•

Course Coordinator: Prof. Dr. Mohamed A El-Samanoudy

Head of Department: Prof. Dr. M.Kamal

Date: / /

Course Specifications of

Electrical Engineering- EPM 212

University: Ain Shams **Faculty: Engineering**

Programme on which the course is given	B. Sc. in Mechanical Department
Major or minor element of program	N.A.
Department offering the program	Automative, Design& Production, and Mechanical Power Eng. Depts.
Department offering the course:	Electrical Power and Machines Department
Academic year/ Level:	2nd, First semester
Date of specification approval:	23 Jan. 2013

A- Basic Information

Title:	Electrical Engineering	**Code:**	EPM-212		
Credit Hours	N.A.	**Lecture:**	2		
Tutorial:	2	**Practical:**	0	**Total:**	**4**

B- Professional Information

1 – Overall aims of course

This course aims to:

- Enrich the student knowledge about application side of electrical power systems such as three-phase systems , equipments in power systems such as Transformers, Induction motors.
- Develop the student ability to analyze and diagnose different loading types of three-phase circuits.
- Supply the student with merits and demerits, and risk effects of specific equipments.
- Train the student to design the transformer equivalent circuits.

2- Intended learning outcomes of course (ILOs)

By the end of this course, the student will be able to:

a- Knowledge and understanding

a1 - Recognize the benefits and importance of studying power system components such as Generating stations , Transformer substations, and three-phase systems.

a2 - Define the different characteristics governing different machines.

a3 - Define the different models describing different machines.

a4 - Recognize the differences between balanced and unbalanced three-phase circuits.

a5 - Identify the characteristics of 3 phase induction motors.

b- Intellectual skills

b1 - Construct the phasor diagrams 3 phase circuits.

b2 - Apply the different theories to model and solve the transformer and magnetic circuits.

b3 - Illustrate the different characteristics of 3 phase induction motors.

c- Professional and practical skills

c1 – Reduce exact equivalent model of a transformer into simple models using circuit reduction techniques.

c2 - Select the appropriate model to analyze and solve specific electrical loadings of a transformer , d.c. and a.c. motors.

-

d- General and transferable skills

d1 - Present technical reports about applications of electrical machines static (transformers) and dynamic machines.

3- Contents

Bylaw 2003: Fundamentals of electrical measuring instruments, Oscilloscopes and their applications, Three-phase systems, Transformers, Electric generators and motors, Dc machines, Synchronous machines, Induction motors, Fractional horsepower motors, Electric traction, Electric transportation, Transmission lines

No	Course Content	Class Lectures	Tutorials	Total
1	Electric power system components	4	4	8
2	3 phase systems	6	6	12
3	Magnetic circuits	4	4	8
4	1- phase transformer	6	6	12
5	D. C. Machines	6	6	12
6	3 phase induction motors	4	4	8
	Total Hours	30	30	60

Program Coordinator: Dr. Mohamed Azzat

Head of Department: Prof. Dr. Hesham Temraz

Date: 23 Jan. 2013

4- Assessment schedule

Assessment Method	No	Description	Week No	Weight (%)
Assignments	1	Assignment 1	Week 3	3
Assignments and Quiz	2	Assignment 2	Week 5	3
Written Exams (mid-term)	3	Midterm Term Exam	Week 8	12
Assignments and Quiz	4	Assignment 3	Week 9	3
Report	5	Report	Week 10	7
Written Exams (final- term)	6	Final Term Exam	Week 16	72
Total				100%

5- List of references

5. 1 Course notes

- Available

5. 2 Essential books (text books)

- M.E. El-Hawary, "Electric Machines with Power Electronic Drives", Jun 2002, Wiley-IEEE Press.

-Batarseh, Issa, Harb, Ahmad , "Power electronics," Springer International Publishing, 2018

5. 3

Recommended books

Periodicals, Web sites, … etc

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Program Coordinator: Dr. Mohamed Azzat

Head of Department: Prof. Dr. Hesham Temraz

Date: 23 Jan. 2013

6- Facilities required for teaching and learning

- Appropriate teaching class accommodations including presentation board and data show.

Course Content/ILO Matrix

Course Content	a1	a2	a3	a4	a5	b1	b2	b3	c1	c2	c3	d1
Locus Diagrams	●					●						
Single Resonance Circuits	●	●							●	●		
Multiple Resonance	●	●									●	●
Magnetically Coupled Circuits	●						●					●
Response of First and Second Order R-L-C	●				●			●	●			
Two-Port Networks	●		●						●	●		
Three-Phase Systems	●			●					●	●		

Learning Method /ILO Matrix

Learning Method	a1	a2	a3	a4	a5	b1	b2	b3	c1	c2	c3	d1
Class Lectures	●	●	●	●	●	●	●	●			●	
Tutorials						●	●	●	●	●	●	●
Self Learning										●		●

Assessment Methods/ILO Matrix

Assessment Method	a1	a2	a3	a4	a5	b1	b2	b3	c1	c2	c3	d1
Assignment 1	●					●						
Assignment 2 and Quiz 1		●							●	●		
Written Exams (mid- term)	●	●				●			●	●	●	
Assignment 3 and Quiz 2					●		●	●	●	●		
Report									●	●	●	●
Written Exams (final- term)		●	●	●	●	●	●	●	●	●	●	

Program Coordinator: Dr. Mohamed Azzat

Head of Department: Prof. Dr. Hesham Temraz

Date: 23 Jan. 2013

Course Specifications of

Electrical Engineering- EPM 212

University: Ain Shams **Faculty: Engineering**

Programme on which the course is given	B. Sc. in Mechanical Department
Major or minor element of program	N.A.
Department offering the program	Automative, Design& Production, and Mechanical Power Eng. Depts.
Department offering the course:	Electrical Power and Machines Department
Academic year/ Level:	2nd, First semester
Date of specification approval:	23 Jan. 2013

A- Basic Information

Title: Electrical Engineering **Code:** EPM-212
Credit Hours N.A. **Lecture:** 2
Tutorial: 2 **Practical:** 0 **Total: 4**

B- Professional Information

1 – Overall aims of course

This course aims to:

- Enrich the student knowledge about application side of electrical power systems such as three-phase systems , equipments in power systems such as Transformers, Induction motors.
- Develop the student ability to analyze and diagnose different loading types of three-phase circuits.
- Supply the student with merits and demerits, and risk effects of specific equipments.
- Train the student to design the transformer equivalent circuits.

2- Intended learning outcomes of course (ILOs)

By the end of this course, the student will be able to:

a- Knowledge and understanding

a1 - Recognize the benefits and importance of studying power system components such as Generating stations , Transformer substations, and three-phase systems.

a2 - Define the different characteristics governing different machines.

a3 - Define the different models describing different machines.

a4 - Recognize the differences between balanced and unbalanced three-phase circuits.

a5 - Identify the characteristics of 3 phase induction motors.

b- Intellectual skills

b1 - Construct the phasor diagrams 3 phase circuits.

b2 - Apply the different theories to model and solve the transformer and magnetic circuits.

b3 - Illustrate the different characteristics of 3 phase induction motors.

c- Professional and practical skills

c1 – Reduce exact equivalent model of a transformer into simple models using circuit reduction techniques.

c2 - Select the appropriate model to analyze and solve specific electrical loadings of a transformer , d.c. and a.c. motors.

-

d- General and transferable skills

d1 - Present technical reports about applications of electrical machines static (transformers) and dynamic machines.

3- Contents

Bylaw 2003: Fundamentals of electrical measuring instruments, Oscilloscopes and their applications, Three-phase systems, Transformers, Electric generators and motors, Dc machines, Synchronous machines, Induction motors, Fractional horsepower motors, Electric traction, Electric transportation, Transmission lines

No	Course Content	Class Lectures	Tutorials	Total
1	Electric power system components	4	4	8
2	3 phase systems	6	6	12
3	Magnetic circuits	4	4	8
4	1- phase transformer	6	6	12
5	D. C. Machines	6	6	12
6	3 phase induction motors	4	4	8
	Total Hours	30	30	60

Program Coordinator: Dr. Mohamed Azzat

Head of Department: Prof. Dr. Hesham Temraz

Date: 23 Jan. 2013

4- Assessment schedule

Assessment Method	No	Description	Week No	Weight (%)
Assignments	1	Assignment 1	Week 3	3
Assignments and Quiz	2	Assignment 2	Week 5	3
Written Exams (mid-term)	3	Midterm Term Exam	Week 8	12
Assignments and Quiz	4	Assignment 3	Week 9	3
Report	5	Report	Week 10	7
Written Exams (final- term)	6	Final Term Exam	Week 16	72
Total				100%

5- List of references

5. 1 Course notes

- Available

5. 2 Essential books (text books)

- M.E. El-Hawary, "Electric Machines with Power Electronic Drives", Jun 2002, Wiley-IEEE Press.

-Batarseh, Issa, Harb, Ahmad , "Power electronics," Springer International Publishing, 2018

5. 3 Recommended books

Periodicals, Web sites, … etc

- ---- ---- ----

Program Coordinator: Dr. Mohamed Azzat

Head of Department: Prof. Dr. Hesham Temraz

Date: 23 Jan. 2013

6- Facilities required for teaching and learning

- Appropriate teaching class accommodations including presentation board and data show.

Course Content/ILO Matrix

Course Content	a1	a2	a3	a4	a5	b1	b2	b3	c1	c2	c3	d1
Locus Diagrams	●					●						
Single Resonance Circuits	●	●							●	●		
Multiple Resonance	●	●									●	●
Magnetically Coupled Circuits	●						●					●
Response of First and Second Order R-L-C	●				●			●	●			
Two-Port Networks	●		●						●	●		
Three-Phase Systems	●			●					●	●		

Learning Method /ILO Matrix

Learning Method	a1	a2	a3	a4	a5	b1	b2	b3	c1	c2	c3	d1
Class Lectures	●	●	●	●	●	●	●	●			●	
Tutorials						●	●	●	●	●	●	●
Self Learning										●		●

Assessment Methods/ILO Matrix

Assessment Method	a1	a2	a3	a4	a5	b1	b2	b3	c1	c2	c3	d1
Assignment 1	●					●						
Assignment 2 and Quiz 1		●							●	●		
Written Exams (mid- term)	●	●				●			●	●	●	
Assignment 3 and Quiz 2					●		●	●	●	●		
Report									●	●	●	●
Written Exams (final- term)		●	●	●	●	●	●	●	●	●	●	

Program Coordinator: Dr. Mohamed Azzat

Head of Department: Prof. Dr. Hesham Temraz

Date: 23 Jan. 2013

Course specifications of

Engineering Economy HUM X31

University: Ain Shams UniversityFaculty: Engineering

Program on which the course is given:	**B. Sc. in Mechanical Engineering**
Major or minor element of program :	**University requirement**
Department offering the program :	**Mechanical Department**
Department offering the course:	**Design and Production Engineering**
Academic year / Level:	**Second Year MechanicalFall semester/03**
Date of specification approval:	

A- Basic Information

Title:	**Engineering Economy**	**Code:**	HUM_x31
Credit Hours:	**N.A.**	**Lecture:**	2
Tutorial :	1	**Practical:**	0
Total:	3		

B- Professional Information

1. Overall aims of course

By the end of the course the students will be able to:

- Complete computations and manipulations using the basic engineering economic equations.
- Use engineering economy to compare alternatives by different methods (ex., the present worth, annual cost, benefit and cost ratio).
- Take economic value into account in virtually any project environment.

2. Intended learning outcomes of course (ILOs)

2.1. Knowledge and understanding

a1- Describes the time value of money.
a2- Distinguishes between the master tools and methods with which to perform economic analyses of engineering projects.

2.2. Intellectual skills

b1- Practices cash flow diagrams and break even charts.
b2- Analyzes the public sector projects economically.
b3- Evaluates different investment/service projects economically.

Course Coordinator:	Prof. Dr. Amin K. Elkharbotly
Program Coordinator:	Dr. HeshamSenbel
Date:	21 /1 /2016

2.3. Professional and practical skills

c1- Relates engineering economic principles and methods to evaluate alternatives and select the most economically.
c2- Recognizes the interest rate terms applied during practice.

2.4. General and transferable skills

d1- Relates gained knowledge to different case studies.

3. Contents

No	Course Content	Lectures	Tutorials	Practical	Total
1	Introduction, general discussion and new terminologies (time value of money)	2	1		3
2	Simple, compound interest rates, payment types, equivalence, and cash flow diagram representation.	2	1		3
3	Factors, effect of time and interest on money (F/P, P/F, P/A, A/P, F/A and A/F factors)	2	1		3
4	Combining factors, Shifted series and single cash flows	2	1		3
5	Factors, effect of time and interest on money (P/G and A/G and Geometric gradient payments).	2	1		3
6	Combining factors for shifted gradient.	2	1		3
7	Nominal and effective interest rates (differences, terminologies, and different cases CP<PP)	2	1		3
8	Nominal and effective interest rates (continuous compounding) and introduction to evaluating alternatives.	2	1		3

Course Coordinator: Prof. Dr. Amin K. Elkharbotly

Program Coordinator: Dr. HeshamSenbel

Date: 21 /1 /2016

No	Course Content	Lectures	Tutorials	Practical	Total
9	Evaluating Alternatives (present worth analysis using LCM and study periods)	2	1		3
10	Evaluating Alternatives (Future worth and annual worth analysis)	2	1		3
11	Capitalized cost.	2	1		3
12	Benefit and cost analysis for single project	2	1		3
13	Incremental benefit and cost analysis for multiple projects	2	1		3
14	Breakeven analysis for single project.	2	1		3
15	Breakeven analysis for multiple projects.	2	1		3
Total Hours		**30**	**15**		**45**

4. Teaching and learning methods

4.1 – Lectures.
4.2 – Tutorial sessions for assignments.

5. Student assessment methods

5.1– Examination

6. Assessment Schedule

Assessment method	No.	Description	Week no.	Weight
Assignment	1	Cash Flow Diagram, Combining Factors, and Nominal and Effective interest Rates	2-6	-
Quiz	1	Cash Flow Diagram, Combining Factors	6-7	3
Exam	1	Mid-term	8	14

Course Coordinator: Prof. Dr. Amin K. Elkharbotly

Program Coordinator: Dr. HeshamSenbel

Date: 21 /1 /2016

Assessment method	No.	Description	Week no.	Weight
Assignment	2	Comparison between alternatives using: Present Worth, Capitalized cost, Future Worth, and Annual Worth Evaluation	8-11	5
Quiz	2	Nominal, Effective interest Rates, and comparisons	12-13	10
Assignment	3	Benefit and Cost Ratio	12-13	2
Assignment	4	Breakeven Analysis	14-15	3
Exam	1	Final Exam		50
Absence				5
Total				75

7. List of references

7.1. Course notes

Handout presentations

7.2. Essential reading (text books)

- Blank, L. and Tarquin, A. "Engineering Economy", 7th edition, 2012.

7.3. Recommended books

7.4. Articles and case studies

7.5. Periodicals

8. Facilities required for teaching and learning

- Lecture Theatre(s)
- Data show

Course Coordinator: Prof. Dr. Amin K. Elkharbotly

Program Coordinator: Dr. HeshamSenbel

Date: 21 /1 /2016

Course Content/ILO Matrix

Course Content	a1	a2	b1	b2	b3	c1	c2	d1
Introduction, general discussion and new terminologies (time value of money)	x					x		
Simple, compound interest rates, payment types, equivalence, and cash flow diagram representation.	X				x	x	x	
Factors, effect of time and interest on money (F/P, P/F, P/A, A/P, F/A and A/F factors)	x				x	x		
Combining factors, Shifted series and single cash flows			x		x			
Factors, effect of time and interest on money (P/G and A/G and Geometric gradient payments).	X				x	x		
Combining factors for shifted gradient.			x		X			
Nominal and effective interest rates (differences, terminologies, and different cases CP<PP)					x	x	x	
Nominal and effective interest rates (continuous compounding) and introduction to evaluating alternatives.					X	x	x	
Evaluating Alternatives (present worth analysis using LCM and study periods)		x			x			x
Evaluating Alternatives (Future worth and annual worth analysis)		x			x			x
Capitalized cost.		X	x		x			x
Benefit and cost analysis for single project		x		x	x			x
Incremental benefit and cost analysis for multiple projects		x		x	x	x		x
Breakeven analysis for single project.		X	x		x	x		
Breakeven analysis for multiple projects.		X	x		x			x

Course Coordinator: Prof. Dr. Amin K. Elkharbotly

Program Coordinator: Dr. HeshamSenbel

Date: 21 /1 /2016

Learning Method /ILO Matrix

Learning Method	a1	a2	b1	b2	b3	c1	c2	d1
Lectures	x	x		x	x	x	x	x
Tutorial Sessions	x	x	x	x	x	x	x	x

Assessment Methods /ILO Matrix

Assessment	a1	a2	b1	b2	b3	c1	c2	d1
Assignment 01	x		x		x	x	x	
Quiz 1	x		x		x	x	x	
Mid Term	x		x		x		x	
Assignment 02		x	x		x			x
Assignment 03		x		x	x	x		x
Quiz 2		x	x	x	x	x		x
Assignment 04		x	x		x	x		x
Final Exam	x	x	x	x	x	x	x	

Course Coordinator:	Prof. Dr. Amin K. Elkharbotly
Program Coordinator:	Dr. HeshamSenbel
Date:	21 /1 /2016

Course specifications of

Manufacturing Technology (3) - MDP 321

University: Ain Shams **Faculty: Engineering**

Program on which the course is given:	B.Sc. in Mechanical Engineering
Major or minor element of program :	**N/A**
Department offering the program :	Mechanical Design and Production Engineering
Department Teaching the course:	Mechanical Design and Production Engineering
Academic year/ Level:	**Fourth year**
Date of specification approval:	24/11/2007

A. Basic Information

Title:	Manufacturing Technology (3)	**Code:**	MDP321
Credit Hours:	**N/A**	**Lecture:**	4
Tutorial :	1	**Lab:**	2
Total:	7		

B. Professional Information

1. Overall aims of course

By the end of the course the students will be able to:

- Understand the theoretical and practical foundations of the different manufacturing technologies in both the machining and forming sectors.
- Implement this knowledge analytically and practically in real manufacturing facilities.
- Define the optimal manufacturing parameters to maximize the profit and minimize the cost of manufacturing
- Identify the products defects resulting from machining and/or forming processes.
- Identify the fundamental concept of different method of metal forming
- Understand advantages and limits for each method of forming processes
- Choose the suitable forming process for specific application

2. Intended learning outcomes of course (ILOs)

a. Knowledge and Understanding

a1.Machining: Understand the machining tolerances and allowances.
a2.Machining: Know the development and calculation techniques for operation and process sheets.
a3.Machining: Understand the operation of semi-automatic lathes (capstan and turret lathes).
a4.Machining: Understand the different types of industrial and mass production-type milling machines, operations, tools and holding devices.
a5.Machining: Understand the different types of gear cutting techniques using forming or generation methods.
a6.Machining: Understand grinding operations in terms of machine tools, tools, workpiece fixation, and operation parameters.
a7.Machining: Understand the different types of superfinishing operations.
a8.Forming: Identify the concept of metal forming processes
a9. Forming: Understand the advantages and limits of forming processes
a10. Forming: Understand the different parameters of forming processes

b. Intellectual Skills

b1. Differentiate between the different forming and machining processes.
b2. Choose the suitable forming/machining process for specific product.
b3. Choose the suitable parameters for the forming / machining processes.

c. Professional and Practical Skills

c1. Recognize capstan and turret lathes operations
c2. Practice on milling m/c (Column and Knee Type Milling Machines)
c3. Practice gear cutting using forming and generation methods
c4. Practice on grinding m/c (surface, cylindrical and centerless)
c5. Introduce the basic concepts of forming processes
c6. Run some experiments of forming processes
c7. Choose the suitable sequence and parameters of forming processes for a specific product

d. General and Transferable Skills

d1. Choose a specific product to conduct an oral and written presentation about the method of production, materials and the sequence of production. Develop the communication skills through practice working in a team. Practice creative thinking through case study, classroom discussion.

Course Coordinator: **Prof. Adel B. El-Shabasy**
Department Head: **Prof. Hesham Sonbel**

Date:

3. Contents

No	Course Content	Lecture (hours)	Tutorial	Lab	Total
1	General Machining Types	4			**4**
2	Tolerances and Allowances	4	3		**7**
3	Capstan and Turret Lathes	4		6	**10**
4	Milling Operations	4		3	**7**
5	Gear Cutting Operations	4		3	**7**
6	Grinding Operations	4		3	**7**
7	Superfinishing Operations	4		3	**7**
8	Introduction to Forming Processes	2	3		**5**
9	Forging Processes	2		3	**5**
10	Roll Pass Design	2	3		**5**
11	Extrusion Processes	2		3	**5**
12	Drawing Processes	2			**2**
13	Forming methods for polymers	4		3	**7**
14	High energy rate forming processes	6	3		**9**
15	Powder metallurgy	6	3		**9**
16	Ceramic and composite materials	6		3 (field visit	**9**
17	**Total**	**60**	**15**	**30**	**105**

4. Assessment schedule

Assessment method	Description	Week No	Weight (%)
Assignments	Allowances and process sheets assignment	1	1
Assignments	Forging assignment	2	1
Student Project	Capstan and turret lathes report	3	1
Assignments	Roll pass design assignment	4	1
Student Project	Milling operations report	5	1
Assignments	Extrusion assignment	6	1
Midterm Exam	Midterm	7	11
Student Project	Gear cutting report	7	1
Assignments	Drawing assignment	8	1
Student Project	Grinding and superfinishing report	9	2
Assignments	Forming methods for polymers report	10	1
Student Project	Powder metallurgy report	12	1
Oral Exam	oral	14	20
Final Exam	Written	15	57
		Total	100%

Course Coordinator: **Prof. Adel B. El-Shabasy**

Department Head: **Prof. Hesham Sonbel**

Date:

5. **List of references**

   a. **Course notes (text books)**

   - Machining course notes
     Forming course notes

   Recommended books

   - E. Paul DeGarmo, Materials and Processes in Manufacturing, John Wiley & Sons Inc, 2005

6. **Facilities required for teaching and learning**

   - Classroom
   - Lecture hall
   - Data Show
   - Machine Shop

Course Content/ILO Matrix

Course Content	a1	a2	a3	a4	a5	a6	a7	a8	a9	a10	b1	b2	b3	c1	c2	c3	c4	c5	c6	c7	d1
General Machining Types		•																			
Tolerances and Allowances																					
Capstan and Turret Lathes			•											•							
Milling Operations				•											•						
Gear Cutting Operations					•											•					
Grinding Operations						•											•				
Superfinishing Operations							•														
Introduction to Forming processes								•													
Forging Processes									•												
Roll Pass Design													•								
Extrusion Processes												•									
Drawing Processes																		•			
Forming methods for polymers																			•		
High energy rate forming processes											•										
Powder metallurgy																				•	•
Ceramic and composite materials										•										•	

Learning Method /ILO Matrix

Course Content	a1	a2	a3	a4	a5	a6	a7	a8	a9	a10	b1	b2	b3	c1	c2	c3	c4	c5	c6	c7	d1
Lectures			•	•	•	•	•	•	•	•	•	•	•								
Tutorial	•					•			•											•	
Workshop/ Seminars				•	•	•			•			•	•	•	•	•	•	•	•		•

Course Coordinator: **Prof. Adel B. El-Shabasy**

Department Head: **Prof. Hesham Sonbel**

Date:

Assessment Methods /ILO Matrix

Course Content	a1	a2	a3	a4	a5	a6	a7	a8	a9	a10	b1	b2	b3	c1	c2	c3	c4	c5	c6	c7	d1
Allowances and process sheets assignment	•	•																			
Forging assignment								•	•												
Capstan and turret lathes student project			•											•							•
Roll pass design assignment											•	•									
Milling operations student project			•											•							•
Extrusion assignment															•						
Midterm	•	•	•	•				•	•												
Gear cutting student project					•											•					•
Drawing assignment																•					
Grinding and superfinishing student project						•	•														•
Forming methods for polymers report															•					•	
Powder metallurgy/composites project																				•	•
Oral											•	•	•	•	•	•	•	•	•		•
Written	•	•	•	•	•	•	•	•	•	•	•	•	•					•		•	

Course Coordinator: **Prof. Adel B. El-Shabasy**

Department Head: **Prof. Hesham Sonbel**

Date:

Course specifications of

Work Study – MDP 322

University: Ain Shams **Faculty: Engineering**

Program on which the course is given: **Design and Production Engineering**
Major or minor element of program: **N/A**
Department offering the program : Design and Production Engineering
Department Teaching the course: Design and Production Engineering
Academic year/ Level: **Level Three**
Date of specification approval:

A. Basic Information

Title:	Work Study	**Code:**	MDP 322
Credit Hours:	**3**	**Lecture:**	2
Tutorial :	2	**Lab:**	0
Total:	4		

B- Professional Information

1 – Overall Aims of Course

By the end of this course the students will be able to:

- Master the techniques of method study and work measurement.
- Identify the improvement areas to improve the productivity in any production situation.
- Understand and apply the techniques used to establish the standard time of a job and calculate the workers incentives.

2 – Intended Learning Outcomes of Course (ILOs)

Knowledge and Understanding:

By the end of this course the students will be able to:

a1- Provide a knowledge and understanding of the concept of productivity.
a2- Master tools and methods record and examine any production process.
a3- Master the techniques used to establish the standard time of a job.
a4- Learn and use basic concepts learning curves and incentives schemes.

Intellectual Skills

b1- Criticize any production process to improve its productivity.
b2- Evaluate the workers' performance and the time needed to complete the job.
b3- Analyze the job time and determine the learning period of the process.

Professional and Practical Skills

c1- Develop the charts and diagrams needed in the recoding phase of the method study.
c2- Perform the needed examination of the recorded situations.
c3- Use the appropriate tools to record the job time.

General and Transferable Skills

d1- Present the recorded charts and diagrams.
d2- Work with his/hers classmates on the case studies presented during the lectures.

3- Contents

Topic	No. of hours	Lecture
Standard of living and productivity	2	2
Introduction to work study	2	2
Introduction to method study	1	1
The procedures of method study: Select	1	1
The procedures of method study: Record (Outline process chart)	4	4
The procedures of method study: Record (Flow process chart and diagram)	3	3
The procedures of method study: Record (Man – Machine chart)	2	2
The procedures of method study: Record (Two handed chart)	2	2
The procedures of method study: Examine	2	2
The procedures of method study: Measure, Install and Maintain.	1	1
Introduction to Work measurement	2	2
Establishment of standard time	2	2
Synthetic time and rated activity sample	2	2
Learning curves	3	3
Incentive schemes	1	1
Total	30	30

4– Teaching and Learning Methods

4.1- Lectures
4.2- Research assignment
4.3- Case studies

5- Assessment schedule

Assessment method	Description	Week No	Weight (%)
Mid Term 1	**Exam (Announced)**	Week 7	10%
Project 1	**Group Project**	Week 4	10%
Project 2	**Group Project**	Week 12	5%
Classes attendance and participation		Week 1- 13	5%
Course work total			30%
Final exam	Final Exam (scheduled)	Week 14	70%
		Total	100%

6- List of References

6.1- Course Notes

- The power point presentations

6.2- Essential Books (Text Books)

- International Labour office, Introduction to work study, 3rd Ed., International Labour office, Geneva, 1997.

6.3- Recommended Books

6.4- Periodicals, Web Sites, … etc

7- Facilities required for teaching and learning

- Data Show Lectures

Course Content/ILO Matrix

Course Content	a1	a2	a3	a4	b1	b2	b3	c1	c2	c3	d1	d2
Standard of living and productivity	•				•							
Introduction to work study		•	•								•	
Introduction to method study		•									•	
The procedures of method study: Select		•										
The procedures of method study: Record (Outline process chart)		•						•			•	•
The procedures of method study: Record (Flow process chart and diagram)		•						•			•	•
The procedures of method study: Record (Man – Machine chart)	•	•						•			•	•
The procedures of method study: Record (Two handed chart)		•						•			•	•
The procedures of method study: Examine					•				•		•	
The procedures of method study: Measure, Install and Maintain.						•			•			
Introduction to Work measurement			•							•	•	•
Establishment of standard time			•			•				•		•
Synthetic time and rated activity sample			•			•				•		•
Learning curves			•	•		•	•					•
Incentive schemes				•								

Learning Method /ILO Matrix

Learning Method	a1	a2	a3	a4	b1	b2	b3	c1	c2	c3	d1	d2
Lectures	•	•	•	•	•	•	•					
Tutorial					•	•	•	•	•	•	•	•

Assessment Methods /ILO Matrix

Assessment Methods	a1	a2	a3	a4	b1	b2	b3	c1	c2	c3	d1	d2
Mid Term 1		•			•			•	•			
Project 1	•	•			•	•		•	•		•	•
Project 2			•	•			•		•	•	•	•
Lectures and tutorials attendance and participation											•	•
Final exam		•	•	•	•	•	•	•	•	•		

Course specifications of

MDP 323 Quality Systems

University: Ain Shams **Faculty: Engineering**

Programme on which the course is given:	**Design and production Engineering**
Major or minor element of programme :	N.A
Department offering the programme :	Design and Production Engineering
Department offering the course:	Design and Production Engineering
Academic year/ Level:	4^{th} year, second semester
Date of specification approval:	/ /

A- Basic Information

Title:	**Quality systems**	**Code:**	MDP 323
Credit Hours:	**N.A.**	**Lecture:**	2
Tutorial :	2	**Practical:**	0
Total:	4		

B- Professional Information

1- Overall aims of course

The overall aim of the course is to provide a clear understanding of the quality systems concepts and definitions. To provide the knowledge needed for managing and organizing the quality in any organization or service. To provide the essential information about process control and design and quality costs. And to give a clear explanation on the phases and the regulation of a quality system certification process

2- Intended learning outcomes of course (ILOs)

a. Knowledge and understanding

a1- Define the different quality definitions
a2- Explain quality functions and concept
a3- Comprehend the history of quality systems
a4- Identify the difference between the quality policy and quality objectives
a5- Identify the nature of quality organization
a6- Recognize the quality cost
a7- Recognize theories of motivation
a8- Recognize vendor relations

b. Intellectual skills

b1- Recognize the contributions of the world experts on quality management
b2- Construct quality policy and quality objectives
b3- Analyze the quality cost
b4- Design manufacturing plans taking into consideration quality aspects
b5- Discover the steps of applying quality system elements

c. Professional and practical skills

c1- Assess means of analyzing quality problems within the organization, thus maintaining high quality and market superiority.
c2- Analyze the results of applying quality system elements
c3- Examine the different quality analysis tools with which the engineer is likely to deal.

d. General and transferable skills

d1- Conduct oral and written presentations.
d2- Practice working in a team to develop communication skills

3- Contents

No	Course Content	lecture	tutorial	Total
1	basic concepts: definition; terminology of the quality system	2	2	4
2	quality function	4	2	6
3	development and design of systems	2	4	6
4	quality policies and objectives	2	4	6
5	Quality planning	2	4	6
6	Organization for quality	2	2	4
7	Quality costs	2	4	6
8	Quality economics	2	2	4
9	Training for quality	4	2	6
10	Motivation for quality	4	2	6
11	Quality certificate	4	2	6
	Total Hours	30	30	60

4- Assessment schedule

Assessment method	Description	Week No	Weight (%)
Assignment	Ass 1	Week 2	2
Assignment	Ass 2	Week 4	2
Assignment	Ass 3	Week 6	2
Project	Project 1	Week 8	15
Assignment	Ass 4	Week 9	2

Assessment method	Description	Week No	Weight (%)
Quiz	quiz 1	Week 10	5
Assignment	Ass 5	Week 12	2
final exam	final exam	Week 16	70
		Total	100 %

5- List of references

a. Course notes

-Developed by course instructors.

b. Recommended books

- Juran, J.M. and Gryna, F.M. "Quality Planning and Analysis",TATAMc-Graw-Hill Book Co., 1970.
- Gryna, F.M., "Quality Planning and Analysis" From Product Development through use, 4th Edition, McGraw Hill, 2001.
- Suganthi, L and Samuel, A.A. "Total Quality management". Prentice-Hall of India, 2005

c. Periodicals, Web sites, … etc

- www.ASQ.org

6- Facilities required for teaching and learning

- Blackboard and projectors in lectures; Blackboard in tutorials

Course Content/ILO Matrix

Course Content	a1	a2	a3	a4	a5	a6	a7	a8	b1	b2	b3	b4	b5	c1	c2	c3	d1	d2
Basic concepts: definition; terminology of the quality system	●													●				
Quality function		●														●		
Development and design of systems			●						●				●		●			
Quality policies and objectives				●						●								●
Quality planning					●	●				●		●		●				
Organization for quality					●												●	
Quality costs						●					●			●				
Quality economics						●												●
Training for quality													●		●			
Motivation for quality							●	●								●		
Quality certificate												●	●		●		●	●

Course Coordinator: Prof. Dr. Adel Mohamed Mahmoud
Head of Department: Prof. Dr. Hesham Senbel
Date: / /

Learning Method /ILO Matrix

Learning method	a1	a2	a3	a4	a5	a6	a7	a8	b1	b2	b3	b4	b5	c1	c2	c3	d1	d2
Lectures	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
Tutorials									●	●	●	●	●	●	●	●	●	●

Assessment Methods /ILO Matrix

Assessment	a1	a2	a3	a4	a5	a6	a7	a8	b1	b2	b3	b4	b5	c1	c2	c3	d1	d2
Assignments	●	●	●	●	●		●		●	●	●	●		●			●	●
Project													●	●	●	●	●	●
Quiz	●	●			●													
Final examination	●	●	●		●	●		●				●	●			●		

Course Coordinator: Prof. Dr. Adel Mohamed Mahmoud
Head of Department: Prof. Dr. Hesham Senbel
Date: / /

Course specifications of

Reliability Engineering - MDP 324

University: Ain Shams **Faculty: Engineering**

Programme on which the course is given	B. Sc.. in Production Engineering
Major or minor element of programme	N.A.
Department offering the programme	Design and Production Engineering
Department offering the course :	Design and Production Engineering
Academic year/ Level :	Fourth year / Second semester
Date of specification approval :	11/24/2007

A- Basic Information

Title :	Reliability Engineering	**code :**	MDP-324
Credit Hours :	N.A.	**Lecture :**	2
Tutorial :	2	**Practical**	**Total:** 4

B- Professional Information

1 – Overall aims of course

By the end of the course the students will be able to:

- On completion of this course students should be able to summarize the foundations of theories for structural reliability engineering, including the associated probability and statistics theory, and be able to deal with the advanced topics such as th

2- Intended learning outcomes of course (ILOs)

a-Knowledge and understanding

a1 - Explain the fundamental concepts of reliability, maintainability and availability to quality professionals, systems engineers and technical managers.

a2 - Learn how the reliability characteristics of components, products and systems depend on time, the environmental and operating conditions, and the system configuration.

a3 - Recognize the specific failure time distributions including the exponential, normal, lognormal, and Weibull.

b-Intellectual skills

b1 - identify suitable failure models and analyse the structure of a system

b2 - use test data and component reliabilities to estimate and put bounds on system reliability

b3 - quantify the behaviour of a renewable system over time, and evaluate the influence of different system maintenance strategies

Course Coordinator: Prof. Dr. Adel Mohamed Mahmoud

Head of Department: Prof. Dr. Hesham Senbel

Date: 11/24/2007

c-Professional and practical skills

c1 - Utilize parametric, nonparametric and the proportional hazards lifetime models to analyze and interpret failure data

c2 - Perform reliability testing and analyze failure data

d-General and transferable skills

d1 - present a systematic, statistical methodology to analyze and handle safety problems in engineering

d2 - present practical applications to system and component reliability

5- List of references

5. 1 Course notes

-

5. 2 Essential books (text books)

- Michael Beasley, "Reliability for Engineers",Macmillan Education Ltd.,1991.
- Carter, A.D.S., "Mechanical Reliability", Macmillan,1996.

5. 3 Recommended books

- Stephen P. Robins,David A. DeCenzo,"Funfamantals of Management", Pearson Prentice Hall, 2005, 5th Ed.

6- Facilities required for teaching and learning

˜ Appropriate teaching class accommodations including presentation board and data show.

Course Coordinator: Prof. Dr. Adel Mohamed Mahmoud

Head of Department: Prof. Dr. Hesham Senbel

Date: 11/24/2007

Course specifications of

Quality of Service Industries - MDP 325

University: Ain Shams **Faculty: Engineering**

Programme on which the course is given	B. Sc. in Production Engineering
Major or minor element of programme	N.A.
Department offering the programme	Design and Production Engineering
Department offering the course :	Design and Production Engineering
Academic year/ Level :	Fourth year / First semester
Date of specification approval :	

A- Basic Information

Title :	Quality of Service Industries	**code :**	MDP-325	
Credit Hours :	N.A.	**Lecture :**	2	
Tutorial :	2	**Practical**		**Total:** 4

B- Professional Information

1 – Overall aims of course

By the end of the course the students will be able to:

- Demonstrate knowledge and understanding of the different quality control tools.
- Introduce students to both qualitative and quantitative information and techniques to arrive at economical and socially responsible solutions.
- Reason critically, both individually and collaboratively, draw sound conclusions from information, ideas, and interpretations gathered from various sources and disciplines
- Apply those conclusions to the solutions of real-world engineering problems.

2- Intended learning outcomes of course (ILOs)

a-Knowledge and understanding

a1 - Provide an introduction to the fundamental concepts of statistical process control, total quality management, six sigma and the application of these concepts, philosophies, and strategies to issues arising in government and industry.

a2 - Enhance the student's understanding of the complexities of statistical analysis and control-chart interpretation and their work-place application.

a3 - Provide skills in diagnosing and analyzing problems causing variation in manufacturing and service industry processes.

a4 - Provide a basic understanding of "widely-used" quality analysis tools and techniques. Create an awareness of the quality management problem solving techniques currently in use.

Course Coordinator: Prof. Dr. Adel Mohamed Mahmoud

Head of Department: Prof. Dr. Hesham Senbel

Date: / /

b-Intellectual skills

b1 - Improve students understanding of statistical tools and their application.

b2 - Assess approaches to analyze different problems and statistical experiments.

b3 - Assess means of analyzing quality problems within the organization, thus maintaining high quality and market superiority.

c-Professional and practical skills

c1 - Identify the different quality analysis tools with which the engineer is likely to deal.

c2 - Deal with professional terms such as presentation of data, hypothesis sampling and control charts.

c3 - Create effective work area.

d-General and transferable skills

d1 - Conduct oral and written presentations.

d2 - Practice working in a team to develop communication skills.

3- Contents

No	Course Content	lectures	tutorial	Total
1	industrialization of service	2	2	4
2	unique nature of service charachteristics	2	2	4
3	the differences between service and manufacturing industries	2	2	4
4	classifications of service industries	2	2	4
5	productivity in service systems	2	2	4
6	service technology	2	2	4
7	service systems design	4	4	8
8	managing quailty in service systems	2	2	4
9	service management	2	2	4
10	customer role in service industry and customer rights	2	2	4
11	customer information program	2	2	4
12	customer compliant	4	4	8
13	customer delight	2	2	4
	Total Hours	30	30	60

Course Coordinator: Prof. Dr. Adel Mohamed Mahmoud

Head of Department: Prof. Dr. Hesham Senbel

Date: / /

4- Assessment schedule

Assessment method	No	Description	Week No	Weight (%)
assignment and quiz	1	assignment1	Week 3	2
reports	5	report1	Week 5	5
assignment and quiz	2	assignment2	Week 5	5
assignment and quiz	3	assignment3	Week 9	5
assignment and quiz	4	quiz	Week 10	5
reports	6	report2	Week 11	5
assignment and quiz		assignment4	Week 12	3
Written exams		final exam	Week 16	70
Total				100 %

5- List of references

5. 1 Course notes

- Course notes

5. 2 Essential books (text books)

- Grant,E.L.,"Statistical Quality Control", McGraw Hill, New York, 1996.
- Motgomery, D. C., "Introduction to Statistical Quality Control", John Wiley and Sons, N.Y., 1997.

5. 3 Periodicals, Web sites, … etc

- www.ASQ.org

6- Facilities required for teaching and learning

- Appropriate teaching class accommodations including presentation board and data show.

Course Coordinator: Prof. Dr. Adel Mohamed Mahmoud
Head of Department: Prof. Dr. Hesham Senbel
Date: / /

Course Content/ILO Matrix

Course Content	a1	a2	a3	a4	b1	b2	b3	c1	c2	c3	d1	d2
industrialization of service	●	●			●							
unique nature of service charachteristics		●										
the differences between service and manufacturing industries		●										
classifications of service industries		●										
productivity in service systems	●											
service technology				●		●						
service systems design		●					●					
managing quailty in service systems	●						●					
service management			●	●								
customer role in service industry and customer rights	●	●										
customer information program		●						●	●	●	●	●
customer compliant	●								●			
customer delight			●							●		

Learning Method /ILO Matrix

Learning Method	a1	a2	a3	a4	b1	b2	b3	c1	c2	c3	d1	d2
lectures	●	●	●	●	●	●	●	●	●	●		
tutorial	●	●	●	●	●	●	●	●	●	●	●	●

Assessment Methods /ILO Matrix

Assessment	a1	a2	a3	a4	b1	b2	b3	c1	c2	c3	d1	d2
assignment and quiz : assignment1	●	●	●	●	●	●	●					
reports : report1											●	
assignment and quiz : assignment2								●	●	●	●	●
assignment and quiz : quiz	●	●	●									
reports : report2												●
exams : final exam	●	●	●	●	●	●	●	●	●			

Course Coordinator: Prof. Dr. Adel Mohamed Mahmoud

Head of Department: Prof. Dr. Hesham Senbel

Date: / /

Course Specifications of

Measuring Instruments – MDP 341

University: Ain Shams	Faculty: Engineering
Program on which the course is given	Production Program
Major or minor element of program	N/A
Department offering the Program	Design and Production Eng.
Department offering the course	Design and Production Engineering
Academic year/ Level	3rd year Production Engineering
Date of specification approval	2013

A – Basic Information

Title	Measuring Instruments	Code	MDP 341
Credit Hours	N/A	Lecture	4 hours/Week
Tutorial/ Lab	4 hours/Week	Total	8 hours/Week

B- Professional Information

1- Overall aim of course

By the end of this course student will be able to:

1	Demonstrate understanding of the elements of measuring system and its main Characteristics
2	Demonstrate understanding of the different magnification concepts.
3	Demonstrate facility in using metrology lab equipment and instruments to determine experimental outcomes.
4	Communicate concept sand experimental results in clear and logical fashion, both verbally and in writing
5	Work with measuring instruments for individual, small group and large group projects. Demonstrate understanding of the grades of limit and fits
6	Demonstrate the Knowledge and laboratory experience acquired through the construction of measuring instruments, simulator.
7	Design the required limit gauges to check the acceptance criteria of a test sample

1- Intended Learning Outcomes (ILOs)

a	**Knowledge and understanding**
a1	state the different measurement standard and units
a2	explain the fundamental concepts of measurements and measuring instruments
a3	identify all elements on the measurement chain

a4	describe all types of magnification principles
a5	explain the concept of limits, fits and tolerance
b Intellectual skills	
b1	compare among different magnification concepts; mechanical, optical, electric and pneumatic types
b2	predict the dynamic response of simple measurement systems
b3	Identify the specification of measuring tools
B4	select the appropriate instrument for different applications
B5	design the limit gauges for different shapes
B6	Identify the specification of measuring instruments
c Professional and practical skills	
c1	Use appropriate metrology lab equipments in different applications
C2	Perform experiments in the metrology lab
C3	Prepare the measuring instruments for sample measurements
C4	Apply measurement using different measuring instruments
d General and transferable skills	
d1	Interpret inspection report according to the scientific standards guideline
d2	Explain the inspection report in oral seminar
d3	Practice working as a part of a team in inspection project group

3 - Contents

Theory of measurements, Definitions, Errors, Linear measurements, Angle measurements.

No	Topic	Lecture	Tutorial	Total
1	International system of units	2	0	2
2	Theory of measurement	2	6	8
3	Measurement errors	2	4	6
4	Statistical analysis of data	2	4	6
5	Physical principles	8	4	12
6	Magnification methods	12	8	20
7	Measuring signals	4	4	8
8	Fits, tolerance and limit gauges	12	8	20

9	Simple measuring instruments	8	10	18
10	Comparators	4	10	14
11	Measuring machines	4	2	6
TOTAL HOURS		**60**	**60**	**120**

Teaching and learning methods

1	Class lectures
2	Tutorials
3	Experimental Laboratory work

List of experiments

No	Experiment Name	Hours
1	Fixed gauges	2
2	Slip gauges	2
3	Vernier	6
4	Micrometer	6
5	Dial Indicators	6
6	Projector	6
7	Microscope	6
8	Comparators	6
9	Abbe measuring machine	6
10	Protractors	4
11	Levels and sine bar	4
12	Miscellaneous	6
	Total	**60**

4- Student assessment methods

1	Written exams (midterm/final)
2	Assignment
3	Study report

Assessment Method	No	Description	Week	Weight
Assignment		Assignment(1)	Week 2	1
Report		Report(1)	Week 3	1
Written Exam		Quiz 1	Week 4	1
Assignment		Assignment(2)	Week 6	1
Report		Report(2)	Week 7	1
Written Exam		Mid-term exam	Week 8	10
Assignment		Assignment(3)	Week 9	1
Report		Report(3)	Week 10	1
Written Exam		Quiz 2	Week 11	1
Assignment		Assignment(4)	Week 12	1
Report		Report(4)	Week 13	1
Lab Examination		Lab and Oral Exam	Week 14	20
Written exams		**Final Exam**	Week 15	60
		Total		100%

5. List of references

	Description	Details
5.1	Course notes	Distributed by the Author
5.2	References books	Gupta, R. C., Engineering Precision Metrology, Khanna Publishers, 1979
		Jain, Engineering Metrology, Khanna Publisher, 1999

5.3	Recommended Books	
5.4	Periodical, Web Sites	

6. Facilities required for teaching and learning

Appropriate teaching class hall/ Presentation board/ Data show.

Metrology lab equipped with computer stations

7- ILOS Matrices

Course Content / ILO Matrix

Course Content	a1	a2	a3	a4	a5	b1	b2	b3	b4	b5	b6	c1	c2	c3	c4	d1	d2	d3
International system of units	●																	
Theory of measurement		●	●															
Measurement errors		●	●															
Statistical analysis of data		●	●															
Physical principles		●	●			●						●	●	●	●	●		●
Magnification methods			●	●		●	●	●	●			●	●	●	●		●	●
Measuring signals			●	●			●											
Fits, tolerance and limit gauges					●					●								
Simple measuring instruments			●	●			●	●	●		●	●	●	●	●	●		●
Comparators			●	●			●	●	●		●	●	●	●	●	●		●
Measuring machines			●	●			●	●	●		●	●	●	●	●	●		●

Learning Method / ILO Matrix

Learning Method	a1	a2	a3	a4	a5	b1	b2	b3	b4	b5	b6	c1	c2	c3	c4	d1	d2	d3
Class Lectures	●	●	●	●	●	●	●	●	●	●	●	●	●					

Experimental												●	●	●	●			●
Internet Search																●	●	●

Assessment Methods / ILO Matrix

Assessment	a1	a2	a3	a4	a5	b1	b2	b3	b4	b5	b6	c1	c2	c3	c4	d1	d2	d3
Assignment(1)	●	●						●			●	●	●					
Report(1)		●							●	●		●	●				●	●
Quiz 1	●	●	●	●														
Assignment(2)	●	●											●	●				
Report(2)	●	●	●			●	●	●					●	●		●	●	●
Mid-term exam	●	●	●			●	●	●										
Assignment(3)							●					●	●					
Report(3)			●	●			●	●	●							●	●	●
Quiz 2	●	●	●	●				●	●	●								
Assignment(4)				●	●					●	●	●	●	●	●			
Report(4)				●	●					●	●					●	●	●
Lab and Oral Exam												●	●	●	●			
Final exam	●	●	●	●	●	●	●	●	●	●	●							

Course specifications of
Mechanics of Machines (2) - MDP 352

University: Ain Shams	**Faculty: Engineering**
Programme on which the course is given	Mechanical Engineering, Production Section
Major or minor element of programme	N.A.
Department offering the programme	Department of Design and Production Engineering
Department offering the course :	Department of Design and Production Engineering
Date of Academic year/ Level :	Fourth Year
specification approval :	28/Sep/2013

A - Basic Information

Title : Mechanics of Machines (2) **Code :** MDP - 352
Credit Hours : N.A. **Lecture :** 4
Tutorial : 2 **Total :** 6

1 – Overall aims of course

By completing this course successfully, the student will be able to:

- Determine the responses of the common vibratory systems to initial and harmonic excitations

2- Intended learning outcomes of course (ILOs)

By completing this course successfully, the student will be able to:

a - Knowledge and understanding

a1- Identify the main components of the common vibratory systems and the number of their degrees of freedom.
a2- Identify the free undamped single degree of freedom systems.
a3- Identify the free damped single degree of freedom systems.
a4- Identify the harmonically excited single degree of freedom systems.
a5- Identify the free and forced undamped two degree of freedom systems.
a6- Identify the free and forced undamped multi degree of freedom systems.

b - Intellectual skills

b1- Add and analyze periodic motions.
b2- Analyze the free undamped single degree of freedom systems.
b3- Analyze the free damped single degree of freedom systems.
b4- Analyze the harmonically excited single degree of freedom systems.
b5- Analyze the free and forced undamped two degree of freedom systems.
b6- Analyze the free and forced undamped multi degree of freedom systems.
b7- Analyze the lateral vibrations of beams and critical speeds of shafts.

c - Professional and practical skills

c1- Predict the vibration output of single degree of freedom systems.
c2- Design a vibration absorber to fulfill a given operating condition for a given excited undamped single degree of freedom system.

d - General and transferable skills

d1- Design a vibration isolator for a given excited single degree of freedom system.
d2- Design vibrating beams and rotating shafts subject to external loads.

3 - Contents

Course Content	Lectures	Tutorials	Total	Instructor
Introduction	6	4	10	M. T. Hedaya
Free Vibration of Undamped Single Degree of Freedom Systems	6	4	10	M. T. Hedaya
Free Vibration of Damped Single Degree of Freedom Systems	8	6	14	A. Elsabbagh
Harmonically Excited Vibration of Single Degree of Freedom Systems	12	6	18	A. Elsabbagh
Vibration of Undamped Two-Degree of Freedom Systems	12	6	18	A. Elsabbagh
Vibration of Undamped Multi-Degree of Freedom Systems	4	2	6	M. Khattab
Free Lateral Vibration of Beams and Critical Speeds of Rotating Shafts	12	2	14	M. Khattab
Total	60	30	90	

4 - Assessment schedule

Assessment method	No	Description	Week No	Weight
Written Exams	1	Mid-Semester Exam	Week 8	20 %
Attendance		Attendance	All	7 %
Written Exams	2	Final Exam		73 %
Total				100 %

5 - List of references

5.1 Course notes

- Mohamed T. Hedaya, "Mechanical Vibration"

5.2 Essential books (text books)

- Singiresu S. Rao, "Mechanical Vibrations", Addison-Wesle
- William T. Thomson, "Theory of Vibration with Applications", Prentice Hall

5.3 Recommended books

- Daniel J. Inman, "Engineering Vibration", Prentice Hall.
- Leonard -- Meirovitch, "Elements of Vibration Analysis", McGraw-Hill

6 - Facilities required for teaching and learning

- Computer
- Data show
- Black board
- Vibration Lab

Course Content/ILO Matrix

Content	a1	a2	a3	a4	a5	a6	b1	b2	b3	b4	b5	b6	b7	c1	c2	d1	d2
Introduction	●						●										
Free Vibration of Undamped Single Degree of Freedom Systems		●						●									
Free Vibration of Damped Single Degree of Freedom Systems			●						●								
Harmonically Excited Vibration of Damped Single Degree of Freedom Systems				●						●				●		●	
Vibration of Undamped Two Degree of Freedom Systems					●						●				●		
Vibration of Undamped Muli-Degree of Freedom Systems						●						●					
Free Lateral Vibration of Beams and Critical Speeds of Rotating Shafts													●				●

Learning Method /ILO Matrix

Learning Method	a1	a2	a3	a4	a5	a6	b1	b2	b3	b4	b5	b6	b7	c1	c2	d1	d2
Lectures	●	●	●	●	●	●	●				●		●				
Tutorials							●	●	●	●	●	●	●	●	●	●	●

Assessment Methods /ILO Matrix

Assessment	a1	a2	a3	a4	a5	a6	b1	b2	b3	b4	b5	b6	b7	c1	c2	d1	d2
Assignments : Exercise 1							●										
Assignments : Exercise 2								●									
Assignments : Exercise 3									●								
Assignments : Exercise 4										●				●		●	
Mid-Semester Exam							●	●	●	●							
Assignments : Exercise 5											●				●		
Assignments : Exercise 6												●					
Assignments : Exercise 7													●				●
Final Exam	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

Course Coordinator: Dr. Adel Elsabbagh
Head of Department: Prof. Dr. Hesham Senbel
Date: 28/Sep/2013

University: Ain Shams University **Faculty: Engineering**

Course specifications

Programme(s) on which the course is given	**Production Engineering**
Major or minor element of programmes	
Department offering the programme	**Design and Production Engineering Department**
Department offering the course	**Design and Production Engineering Department**
Academic year / Level:	**3/1**
Date of specification approval	

A- Basic Information

Title	**Automatic Control**
Code	**MDP 353**
Credit Hours	**N/A**
Lecture	**2 hr/week**
Tutorial	**1 hr/week**
Practical	**1 hr/week**
Total	**4 hr/week**

B- Professional Information

1 – Overall aims of course:

The aims of this course are to develop the students ability to :

1. **Understand the function and the principle of operation of the different logic and discrete event (DE) industrial control systems.**
2. **Analyze, simulate and design the logic (combinational and sequential) and the DE control systems using the different techniques.**
3. **Train the students to select, write the specs., test , assemble, debug and troubleshoot the logic and DE control systems.**
4. **Develop within each student a measurable degree of competence in the design, construction , operation and evaluation of logic automated systems and solving the related problems.**
5.

2 - Intended learning outcomes of course (ILOs)
By the end of the course the students should be able to:

a- Knowledge and understanding

The student should be able to:
a1- describe and explain the different types of control systems (Logic & Discrete event (DE) & Servos).

a2- describe and explain the different logic control sensors and signal input components: push buttons – limit, proximity and optical switches – shaft encoders).
a3- Explain the logic components: (logic gates, FF's, timers, counters)and their interpretation electronically , electrically and pneumatically.
a4- Identify the hydraulic and pneumatic control components and their functions.
a5- select the appropriate control components for certain application and writing the relevant specifications.
a6 – demonstrate the configuration and the procedures for the design of the combinational, sequential and the DE systems with examples
a7- simulate some designed LCS projects using the well-known packages (e.g. AS , EWB , Matlab , Proteus , …etc.) .
a8- application of the PLC's for the design of the LC and DE systems.
a9- efficiently use the well-known programming languages to write application programs (e.g. Ladder , STL or IL and the FBD) .

b- Intellectual skills

The student should be able to:
b1- choose suitable components for logic control systems.
b2 – design a combinational control system for a given task.
b3- design a sequential control system to perform a given sequence.
b4- judge if the type of logic control system is suitable for application.
b5- diagnose troubleshooting problems and their causes.
b6- Develop and design some typical industrial LCS using the PLC.
b7 – apply the gained concepts on the production lines, CNC machines, FMS and CIM.

c- Professional and practical skills

The student should be able to:
c1- use the available equipment to be trained on handling the LCS components and their testing.
c2- assemble and test of at least two LC and DE systems by simulation and H/W implementation.
c3- use the available PLC lab to be trained on its handling, wiring , connecting , programming and operation of the PLC with at least two types of applications.
c4- design and implement at least two logic control system projects using the PLC and write the corresponding technical reports.

d- General and transferable skills

The student should be able to:
d1- write modern advanced reports about all the projects implemented in this course.
d2- train to retrieve information using Internet about the state of the art of LCS.

d3- present a communication skills through small discussions groups during the implementation of the projects.

Course Contents:
1- Introduction and objectives, Control systems types , configurations and examples (LC ,DE and servo systems).
2- Control system components (1): sensors and signal input components: push buttons – limit, proximity and optical switches – shaft encoders).
3- control system components (2): the logic components: (logic gates, FF's, timers, counters)and their interpretation electronically , electrically and pneumatically.
4- the hydraulic and pneumatic control system components and their standard symbols.
5- Design of the Combinational logic control systems.
6 - Design of the sequential logic and the discrete event (DE) control systems using: step and displacement diagrams, State –diagrams, Ladder diagram, SFC, Grafcet, Petri nets, sequencers with examples.
7- The PLC configuration, H/W , S/W with examples to show how to use it.
8- Programming using LAD , SFC, STL/IL , FBD.
9- Applications on the production lines, CNC, FMS and CIM.
10- Position and speed servo systems and their structure.

3- Contents

Topic	No. of Hours	Lecture	Tutorial/ Practical
1- Introduction and objectives, Control systems types , configurations and examples (LC ,DE and servo systems).	4	2	1/1
2- Control system components (1): sensors and signal input components: push buttons – limit, proximity and optical switches – shaft encoders).	4	2	1/1
3- control system components (2): the logic components: (logic gates, FF's, timers, counters)and their interpretation electronically , electrically and pneumatically.	8	4	2/2
4- the hydraulic and pneumatic control system components and their standard symbols.	4	2	0/2

5- Design of the Combinational logic control systems.	8	4	2/2
6 - Design of the sequential logic and the discrete event (DE) control systems using: step and displacement diagrams, State – diagrams, Ladder diagram, SFC, Grafcet, Petri nets, sequencers with examples.	8	4	2/2
7- The PLC configuration, H/W , S/W with examples to show how to use it.	4	2	0/2
8- Programming using LAD , SFC, STL/IL , FBD.	4	2	0/2
9- Applications on the production lines, CNC, FMS and CIM.	2	2	
10- Position and speed servo systems and their structure.	2	2	
Total no. of hours for the course	48	24	9/15

COURSE PLAN

Course Aims					Course ILO's		Course Contents (Topics)										Assessment Methods						
1	2	3	4	5	Type	No.	1	2	3	4	5	6	7	8	9	10	Lectures(h)	Tutorials(h)	Lab. (h)	Assignments	Lab. Report	Quiz	Written
☺	☺		☺		Knowledge & Understanding	a1	☺									☺	2					☺	☺
☺	☺		☺			a2		☺									2	1	1	☺			☺
☺	☺		☺			a3			☺								2	1	1	☺			☺
☺	☺		☺			a4				☺			☺				2	1	1	☺			☺
☺	☺		☺			a5		☺	☺	☺										☺			☺
☺	☺		☺			a6					☺	☺					10	5	5	☺			☺
☺	☺		☺			a7					☺	☺				☺				☺			
☺	☺		☺			a8							☺	☺			4		6	☺			
☺	☺		☺			a9							☺	☺						☺			
☺	☺		☺		Intellectual Skills	b1		☺	☺	☺										☺			☺
☺	☺		☺			b2					☺									☺			☺
☺	☺		☺			b3						☺								☺			☺
☺	☺		☺			b4					☺	☺								☺			☺
☺	☺		☺			b5					☺	☺								☺			☺

☺	☺		☺			b6							☺	☺						☺			☺
☺	☺		☺	☺		b7	☺								☺		2	2		☺			
		☺		☺	Professional & Practical Skills	c1		☺	☺	☺											☺		
		☺		☺		c2					☺	☺									☺		
		☺		☺		c3							☺	☺							☺		
		☺		☺		c4							☺	☺							☺		
						c5																	
						c6																	
				☺	General & Transferable Skills	d1			☺	☺	☺	☺	☺	☺	☺	☺							
				☺		d2			☺	☺	☺	☺	☺	☺	☺	☺							
				☺		d3			☺	☺	☺	☺	☺	☺	☺	☺							
						d4																	
						d5																	
						d6																	
																	24	10	14				

4– Teaching and learning methods

4.1- Lectures supported by lecture notes.
4.2- Worked examples Question sheets
4.3- Demonstrations and presentations contain movies.
4.4- assignment reports during the course
4.5- Automation studio and other programs for simulation.
4.6- LC lab. + PLC lab.

5- Student assessment methods

5.1 Assignment 1 to assess …1-2
5.2 Mid Term Exam. to assess …1-2-3
5.3 Assignment 2 to assess …4
5.4 Lab. Exam to assess…..5-6
5.5 Final Exam to assess All (Summative Exam.)

Assessment schedule

Assignment 1…………………. Week …… 4.
Mid Term Exam …………… week ………8
Assignment 2…………………. Week …… 11.
Lab Exam. …………………. Week …… 14.
Final Exam ……………………week ………?

Weighting of assessments

Mid-term examination 15

Final-term examination	**70**
Oral examination	**--**
Practical examination	**10**
Semester work	**10**
Other types of assessment	**--**
Total	**100**

6- List of references

6.1- Course notes

Lectures distributed during the course

6.2- Essential books (text books)

Srivinas, D. and Richard, N., Sequential Logic Testing and Verification, Kluwer Academic Publishers, 1991.
Lala, Parag K., Practical Digital Logic Design and Testing, Prentice Hall, 1995.
Ozbay, H., Introduction to Feedback Control Theory, CRC Press, 1999.
Levine, W. S., Control System Applications, CRC Press, 1999.
Bolton W ; Programmable Logic Controllers ; Elsevier Ltd. 2006.
Siemens S7 documentation for Simatic S/W and H/W PLC.

6.3- Recommended books

Igor Lazar Krivts German Vladimir Krejnin," Pneumatic Actuating Systems for Automatic Equipment", CRC Press Inc, 2006.
Bruce E. Mccord "Designing pneumatic control circuits: Efficient Techniques for Practical Applications" Marcel Dekker Inc New York, 1983.
J.P. Hasebrink, and R. Kobler," Control Engineering 1: Fundamentals of Pneumatics/Electropneumatics", Festo 7301 Berkheim W. Germany,1975.

6.4- Periodicals, Web sites, … etc

IEEE journals : http://ieeexplore.ieee.org/
Hugh Jack, "Automating Manufacturing Systems with PLCs", GNU Free Document License, 2007. http://claymore.engineer.gvsu.edu/~jackh/books/plcs/
Integration and Automation of Manufacturing Systems:
http://claymore.engineer.gvsu.edu/~jackh/books/integrated/

7- Facilities required for teaching and learning

Computer Lab, Automatic Control Lab., PLC Lab., data show, Automation Studio and other softwares.

Course coordinator: Prof. Farid Tolbah
Head of Department:
Date: / /

Course specifications of

Machine Design–MDP 361

University: Ain Shams **Faculty: Engineering**

Programme on which the course is given:	B. Sc. in Mechanical Engineering
Major or minor element of programme:	NA
Department offering the programme:	Design and Production Engineering
Department offering the course:	Design and Production Engineering
Academic year/ Level:	Fourth Year/Continuous course
Date of specification approval:	02/06/2017

A- Basic Information

Title:	Machine Design	**Code:**	MDP 361
Credit Hours:	**NA**	**Lecture:**	4
Tutorial:	4	**Practical:**	0
Total:	4		

B- Professional Information

1- Overall aims of course

By the end of the course the students will be able to:

- Understand and analyze mechanical power transmissionsystems.
- Design single and multi-unit mechanical systems.
- Specify and select mechanical standard parts according to the required needs.
- Present fully detailed constructional and working drawings for mechanical elements.

2- Intended learning outcomes of course (ILOs)

a. Knowledge and understanding

a1- Demonstrate mechanical power transmission systems.
a2- Design mechanical systems including various elements.
a3- Explain the various loads and stresses acting on mechanical systems.

b. Intellectual skills

b1- Analyze mechanical systems based on power flow analysis.
b2- Suggest alternative designs for power transmission systems.

c. Professional and practical skills

c1- Deal with various mechanical design systems.
c2- Utilize drafting and design computer software's for presenting mechanical designs.

Course Coordinator: Prof. Samy J. Ebeid

Unit Head: Prof. Ahmed Moneeb El sabaagh

Date: 02/06/2017

d. General and transferable skills

d1-Present constructional drawing and design sheets for mechanical power transmission systems.

d2-Experience team work to submit projects utilizing 3D design software's.

3- Contents

No	Course Content	Lecture (hours)	Tutorial	Total
1	Clutches - Introduction	2	2	4
2	Clutches - Geometry Considerations	3	3	6
3	Clutches - Force Generation	2	2	4
4	Clutches – Types	2	2	4
5	Flat Belt Drives	2	2	4
6	V-Belt Drives	2	2	4
7	Belt Drives - Tensioning Devices	3	3	6
8	Variable Speed Drives – Introduction	2	2	4
9	Variable Speed Drives - Roller Drives	2	2	4
10	Variable Speed Drives - Tilting Drives	3	3	6
11	Variable Speed Drives - Spherical Drives	3	3	6
12	Antifriction Bearings – Introduction	2	2	4
13	Antifriction Bearings - Load Carrying Capacity	2	2	4
14	Antifriction Bearings - Selection and Location	2	2	4
15	Sliding Bearings - Viscosity and Friction	2	2	4
16	Sliding Bearings - Hydrodynamic and Hydrostatic Actions	2	2	4
17	Sliding Bearings - Heat Balance	2	2	4
18	Gearing - Introduction	2	2	4
19	Gearing - Spur Gears	5	5	10
20	Gearing - Helical Gears	3	3	6
21	Gearing - Bevel Gears	5	5	10
22	Gearing - Worm Drives	3	3	6
23	Computer Aided Design	4	4	8
	Total	**60**	**60**	**120**

4- Assessment schedule

Course Coordinator: Prof. Samy J. Ebeid

Unit Head: Prof. Ahmed Moneeb El sabaagh

Date: 02/06/2017

Assessment method	No	Description	Week No	Weight (%)
Assignment	1	Assignment 1	3	3
Assignment	2	Assignment 2	6	3
Quiz	1	Quiz 1	8	5
Assignment	3	Assignment 3	9	3
Mid Term	1	Mid Term	11	6
Assignment	4	Assignment 4	14	3
Quiz	2	Quiz 2	16	5
Report	1	Report 1	18	2
Assignment	5	Assignment 5	19	3
Quiz	3	Quiz 3	23	5
Report	2	Report 2	26	2
Final Exam	1	Final Exam	30	60
Total				100 %

5- List of references

a. Course notes

-Design data sheets.

b. Essential books (text books)

-Shigley, J.E., Mechanical Engineering Design, 8th Edition, McGraw Hill, 2008, Budynas−Nisbett, ISBN 0−390−76487−6.

-Reshetov, D.N., "Machine Design", Mir Publishers, Moscow, 1978.

c. Recommended books

-Shigley, J.E., Mischke, C.R. and Budynas, R.G., Mechanical Engineering Design, 7th Edition, McGraw Hill, 2004, ISBN 0-07-292193-5.

-Madsen, D.A., Madsen, D.P. and Turpin, J.L., "Engineering Drawing and Design", 4th Edition, Thomson Delmar Learning, 2007.

d. Periodicals, Web sites, … etc

Different sites are selected by the students including text data, presentations and videos as necessary.

6- Facilities required for teaching and learning

Course Coordinator: Prof. Samy J. Ebeid

Unit Head: Prof. Ahmed Moneeb El sabaagh

Date: 02/06/2017

- Appropriateteaching equipmentincluding presentation board, data show and computer in lectures and tutorials.

Course Content/ILO Matrix

Course Content	a1	a2	a3	b1	b2	c1	c2	d1	d2
Clutches	•							•	
Belt Drives	•	•							
Variable Speed Drives	•			•				•	
Antifriction Bearings	•			•				•	
Sliding Bearings	•	•							
Gearing	•		•		•	•	•		
Computer Aided Design	•								•

Learning Method /ILO Matrix

Learning Method	a1	a2	a3	b1	b2	c1	c2	d1	d2
Lecture	•	•	•	•	•				
Tutorial				•	•	•	•	•	•

Assessment Methods /ILO Matrix

Course Content	a1	b1	b2	c1	c2	d1	d2
Assignment 1	•	•					
Assignment 2	•				•	•	
Assignment 3	•	•					
Assignment 4	•	•					
Assignment 5	•					•	
Quiz 1		•	•				
Quiz 2		•	•				
Mid term	•	•		•	•		
Report 1						•	•
Report 2						•	•
Final exam	•	•		•		•	

Course Coordinator: Prof. Samy J. Ebeid

Unit Head: Prof. Ahmed Moneeb El sabaagh

Date: 02/06/2017

Course specifications of

Theory of Metal Cutting– MDP 371

University: Ain Shams **Faculty: Engineering**

Program on which the course is given:	B. Sc.. in Mechanical Engineering (production)
Major or minor element of program :	N.A.
Department offering the program :	Design and production engineering
Department offering the course:	Design and Production Engineering
Academic year/ Level:	Fourth year/First semester
Date of specification approval:	

A- Basic Information

Title:	**Theory of Metal Cutting**	**Code:**	MDP-371
Credit Hours:	**N.A.**	**Lecture:**	2
Tutorial :	1	**Practical:**	1
Total:	4		

B- Professional Information

1- Overall aims of course

By the end of this course, the student will be able to:

- Assess the cutting conditions required to attain the specified product quality
- Calculate the cutting forces, torque and motor power for different machining processes.
- Explain the different machining phenomena e.g, BUE, chatter, tool failure,…etc
- Select the proper tool material & tool geometry for different machining operations.
- Solve different machining problems, such as tool failure, poor machinability of certain material, chatter occurrence, … etc

2- Intended learning outcomes of course (ILOs)

a. Knowledge and understanding:

a1. Explain of different problems encountered in machining.
a2. Identify the most proper tool material & tool angles
a3. Explain of tool geometry, selection of machining variables.

b. Intellectual skills:

bl. Calculate the chip compression ratio
b2. Calculate cutting force, torque and power in different machining processes.
b3. Calculate cutting temperature in different machining processes
b4. Calculate the tool life and cutting speed.

C. Professional and practical skills:
C1. Select tool material.
C2. Solve surface roughness problem and chatter problem.
C3. Determine optimum cutting conditions.

3- Contents

No	Course Content	Lecture	Tut & Lab	Total 1
Basic	concepts & definitions	2	2	4
2	Chip formation	2	2	4
3	Cutting Force	4	4	8
4	Cutting temperature	2	2	4
5	Machinability criteria	2	2	4
6	Machine tool chatter	2	2	4
7	Mechanics of cutting	2	2	4
8	Optimization of machining variables	2	2	4
9	Surface quality	2	2	4
10	Tool failure	2	2	4
11	Tool geometry	4	4	8
12	Tool life relationship	2	2	4
13	Tool material	2	2	4
	Total	30	30	60

4- Assessment schedule

Assessment method	No	Description	Week No	Weight (%)
Assignment	1	Assignment1	3	2
Assignment	2	Assignment2	5	2

Course Coordinator: Prof. Dr. M. A. El Hakim

Head of Department: Prof. Dr. Hesham Senbel

Date: / /

Written Exam	3	Mid-term exam	7	10
Assignment	4	Assignment 3	9	3
Quiz	5	Quiz	10	5
Report	6	Report	11	5
Assignment	7	Assignment4	12	3
Written Exam	8	Final Exam	16	70
Total				100 %

5- List of references

a. Course notes

M. A. El Hakim, theory of metal cutting

b. Essential books (text books)

1-Stephenson, D. A. & Agapiou, " Metal Cutting Theory & process"

2- Shaw, M. C. " Metal Cutting Principles " Technology Press MIT

3- Boothroyd, D. " Fundamentals of Metal Machining & Machine tools", McGraw Hill Co.

6- Facilities required for teaching and learning

1. Appropriate teaching class accommodations including; data show, presentation board and white board.
2. Overhead projector.

Course Coordinator: Prof. Dr. M. A. El Hakim

Head of Department: Prof. Dr. Hesham Senbel

Date: / /

Course Content/ILO Matrix

Course Content	a1	a2	a3	b1	b2	b3	b4	c1	c2	c3
Basic concepts & definitions		●		●						
Chip formation	●									
Cutting Force		●							●	
Cutting temperature	●		●							
Machinability criteria				●						
Machine tool chatter				●					●	
Mechanics of cutting					●					
Optimization of machining variables						●				
Surface quality						●				
Tool failure								●		
Tool geometry								●		
Tool life relationship										
Tool material									●	●

Course Coordinator: Prof. Dr. M. A. El Hakim

Head of Department: Prof. Dr. Hesham Senbel

Date: / /

Learning Method /ILO Matrix

Course Content	a1	a2	a3	b1	b2	b3	b4	c1	c2	c3
Lecture	●	●	●	●	●	●	●	●		
Tutorial	●	●	●	●			●		●	●

Assessment Methods /ILO Matrix

Assessment	a1	a2	a3	b1	b2	b3	b4	c1	c2	c3
Assessment 1			●							
Assessment 2			●							
Mid Term exam	●	●	●	●	●	●				
Assessment 3							●			
Qvi3				●				●	●	
Report				●			●	●	●	
Assessment 4		●	●							
Final Exam	●	●	●	●	●	●	●	●	●	●

Course Coordinator: Prof. Dr. M. A. El Hakim

Head of Department: Prof. Dr. Hesham Senbel

Date: / /

Course specifications of

Machines of Metal Cutting & Forming - MDP 372

University: Ain Shams **Faculty: Engineering**

Program on which the course is given:	B.Sc. in Mechanical Engineering
Major or minor element of program :	N.A.
Department offering the program :	Mechanical Design and Production Engineering
Department offering the course:	Mechanical Design and Production Engineering
Academic year/ Level:	3rd year, second term
Date of specification approval:	15/12/2016

A- Basic Information

Title:	Machines of Metal Cutting & Forming	**Code:**	MDP-372
Credit Hours:	**N.A.**	**Lecture:**	4
Tutorial :	4	**Practical:**	
Total:	8		

B- Professional Information

1- Overall aims of course

By the end of the course the students will be able to:

- Predict the accuracy of products, machined on metal cutting machine tools (MCMT).
- Select the appropriate MCMT, as well as the Parameters as the metal cutting to attain a required level of accuracy of product.
- Design elements of MCMT (e.g., drives, spindle units, frame parts).
- Study the types of dies.
- Study shearing dies.
- Study bending dies.
- Study deep drawing dies.

2- Intended learning outcomes of course (ILOs)

a. Knowledge and understanding

a_1- Prediction of the machine – Fixture – tool- work piece (MFTW) behavior as a whole system responsible for product accuracy.Understanding of the concept of accuracy of a product.

a2- Knowledge of concepts: rigidity, instantaneous center of rotation ,equivalentforce, flexibility, run out, balance of elastic deformations, kinematics structure,efficiency.

a3-Identify types of dies.

a 4-Know types of shearing dies, types of bending dies and types of beep drawing

b. Intellectual skills

b1-Formulation of a mathematic model for the prediction of the elastic behavior of any element of the MFTW system

b2. Differentiate between dies.

b3. Identify the dies applications.

b4. Identify the deep drawing dies.

b5. Analyze different methods for die design .

c. Professional and practical skills

C 1- Identify data and structure of realistic machine tool drive.

C2- Design of the metal cutting machine tools elements.

C3- Selection of the appropriate metal cutting machine tool to attain the required of accuracy of the product.

C4- Selection of cutting conditions and improvement of work piece& tool mounting to attain the required product accuracy elastic.

d. General and transferable skills

d1. Write reports according to standard.

d2. Improve the ability of working in a team.

d3. Develop the creative thinking

3- Contents

No	Course Content	Number of lecturing hours	Tut	Total
1	Performance criteria of machine tool design	2	2	4
2	Rigidity of MFTW system and the accuracy of production on machine tools	6	6	12
3	Determination of main specifications of machine tool to be designed	2	2	4
4	Drives of machine tools	8	8	16

Course Coordinator: Prof. Hamed El Mously

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Date:

5	Machine tool spindles and spindle bearings	**4**	**4**	**8**
6	Frame Parts of machine tools	**2**	**2**	**4**
7	Joints of machine tools	**2**	**2**	**4**
8	Machine tool testing and research	**4**	**4**	**8**
9	Introduction to die design	**4**	**4**	**8**
10	Materials used in die design	**4**	**4**	**8**
11	Shearing dies concepts	**4**	**4**	**8**
12	Design and calculations of shearing dies	**8**	**8**	**16**
13	Design and calculation of bending dies	**4**	**4**	**8**
14	Deep drawing dies	**6**	**6**	**12**
	Total	**60 hours**	**60**	**120**

4- Assessment schedule

No	Assessment method	Description	Week No	Weight marks
1	Written exams	Quiz	Weekly	10
2	Assignments	Assignments	Weekly	5
3	Written exams	Midterm exam	7	20
4	Assignments	Report to assess practical and presentation skills	11	5
5	Exams	Oral exam	15	40
6	Written exams	Final exam	15	120
	Total			200

5- List of references

5. 1 Course notes

5. 2 Essential books (text books)

- Acherkan N.S. Machine tool Design, vd, 1,2,3,4 Mir Publishers, Moscow, 1968
Call no.:621.902.AM

Course Coordinator: Prof. Hamed El Mously

Head of Department: Prof. Ahmed Moneeb El sabaagh

Date:

5. 3Recommended books

- Koenigsbenger F. Design Principles of Metal cutting Machine tools. The Machine tools. The Macmillan co., 1964
  Call no.:621.902.K D

-Handbook of Die Design 2nd Edition

5. 4 Periodicals, Web sites … etc.

- www.ieee.org

6- Facilities required for teaching and learning

1- Appropriate teaching class accommodations including presentation board and data show

2- Computer Lab

Course Coordinator: Prof. Hamed El Mously

Head of Department: Prof. Ahmed Moneeb El sabaagh

Date:

1. Course Content/ ILO Matrix

Course content	a1	a2	a3	a4	b 1	b 2	b 3	b 4	b 5	c1	c2	C 3	C4	d1	d2	d3
Performance criteria of machine tool design	*				*	*			*	*	*		*	*	*	
Rigidity of MFTW system and the accuracy of production on machine tools		*				*					*				*	
Determination of main specifications of machine tool to be designed	*				*		*			*				*		*
Drives of machine tools		*					*								*	
Machine tool spindles and spindle bearings	*	*					*		*	*	*					
Frame Parts of machine tools	*	*				*	*				*					
Joints of machine tools	*				*	*		*	*		*	*	*	*	*	*
Machine tool testing and research	*			*	*	*		*		*		*			*	
Introduction to die design	*	*		*		*		*	*	*		*	*		*	*
Materials used in die design		*	*	*	*	*					*					
Shearing dies concepts		*	*				*		*		*		*			*
Design and calculations of shearing dies			*			*										
Design and calculation of bending dies		*	*			*			*		*		*		*	*
Deep drawing dies		*				*					*				*	

2. Learning Method / ILO Matrix

Learning	a1	a2	a3	a4	b 1	b 2	b 3	b 4	b 5	c1	c2	C 3	C4	d1	d2	d3
Lecture	*	*	*	*	*	*	*	*	*	*	*		*	*	*	*
Tutorial		*		*	*		*		*			*		*		*

Course Coordinator: Prof. Hamed El Mously

Head of Department: Prof. Ahmed Moneeb El sabaagh

Date:

3. Assessment Methods / ILO Matrix

Course Content	a1	a2	a3	a4	b 1	b 2	b 3	b 4	b 5	c1	c2	C 3	C4	d1	d2	d3
Quiz	*	*	*	*	*	*	*	*	*	*	*					
Reports		*			*		*		*							*
Assignments				*		*			*			*		*	*	
Mid Term.	*	*					*			*	*					
Oral	*	*				*	*	*				*	*			
Final exam	*	*	*	*	*	*	*	*	*	*	*	*	*	*		

Course Coordinator: Prof. Hamed El Mously

Head of Department: Prof. Ahmed Moneeb El sabaagh

Date:

Course specifications of

Theory of Metal Forming– MDP 381

University: Ain Shams **Faculty: Engineering**

Program on which the course is given:	**Manufacturing Engineering Program**
Major or minor element of program :	**N/A**
Department offering the program :	**Production Engineering &Design Dept.**
Department Teaching the course:	**Production Engineering &Design Dept.**
Academic year/ Level:	**Fourth year/Second semester**
Date of specification approval:	

A. Basic Information

Title:	**Theory of Metal Forming**	**Code:**	**MDP-381**
Credit Hours:	**N.A.**	**Lecture:**	**2**
Tutorial:	**1**	**Practical:**	**1**
Total:	**4**		

B. Professional Information

1. Overall aims of course

By the end of the course the students will be able to:

- Demonstrate knowledge and understanding of theoretical analysis of metal forming.
- Represent the theoretical analysis of metal forming processes.
- Recognize different types of theoretical analysis of metal forming processes.
- Formulate load and power problems and identify data required to solve them.
- Solve load and power problems using both approximate and numerical techniques.
- Assess the theoretical analysis of metal forming processes..
- Perform some mechanical measurements.

2. Intended learning outcomes of course (ILOs)

a. Knowledge and Understanding

a1. Define the theoretical analysis of metal forming.
a2. Explain metal forming processes.
a3. Define problems in metal forming.
a4. Know the calculation for load and power in metal forming processes.

b. Intellectual Skills

b1. Assess theoretical analysis of metal forming processes.
b2. Assess experimental work of metal forming processes.
b3. Suggest alternative solutions to metal forming processes.

c. Professional and Practical Skills

c1. Identify data and structure of theoretical analysis of metal forming processes.
c2. Deal with experimental work of metal forming processes.
c3. Analyze load and power data and parameters affecting metal forming processes.

d. General and Transferable Skills

d1. Present theoretical analysis of metal forming processes.
d2. Write technical reports and conduct presentation about metal forming processes.
d3. Practice working in a team to develop theoretical metal forming processes..

3. Contents

No	Course Content	Lecture (hours)	Tutorial (hours)/Lab	Total
1	Introduction, Mechanical and Metallurgical fundamentals	6	4	10
2	Tensor and yield criteria	4	4	8
3	Springback and classification of metal forming processes	3	2	5
4	Forging analysis	3	4	7
5	Rolling analysis	3	4	7
6	Extrusion analysis	3	3	6
7	Wire drawing analysis	4	4	8
8	Tube drawing analysis	3	3	6
9	Deep drawing analysis	1	2	3
	Total	30	30	60

Course Coordinator: **Prof. Moustafa Chaaban**

Head of Department: **Prof. Ahmed Moneeb Elsabagh**

Date:

4. Assessment schedule

Assessment method	Description	Week No	Weight (%)
Assignments	Assignment	3, 4, 5, 6	8
Two Quizzes	Quiz	7, 12	7
Written Exam	Mid-Term Exam	8	15
Written Exam	Final Exam	15	70
Total			100

5. List of references

a. Essential books (text books)

1. Chaaban M.A., "An Introduction to Metal Forming", Central Agency for University

b. Recommended books

1. Johnson, W., and Mellor, P.B., "Plasticity for Mechanical Engineers". Van Nostrand, 1962.
2. Ford H, and Alexander, I.M., "Advanced Mechanics of Materials", Longman Green, London, 1963.
3. Rowe, G.W., "An Introduction to the Principles of Metalworking". Edward Arnold, London, 1965.

Facilities required for teaching and learning

1. Appropriate teaching class accommodations including; data show, presentation board and white board.
2. Metal forming laboratory equipment, instrumentations and facilities

Course Content/ILO Matrix

Course Content	a1	a2	a3	a4	b1	b2	b3	b4	c1	c2	c3	c4	d1	d2	d3	d4
Introduction, Mechanical and Metallurgical fundamentals	•					•			•			•				
Tensor and yield criteria	•		•			•				•						
Springback and classification of metal forming processes	•	•			•		•									•
Forging analysis		•		•	•		•		•		•		•	•		•
Rolling analysis				•	•		•		•		•		•	•		

Course Coordinator: **Prof. Moustafa Chaaban**

Head of Department: **Prof. Ahmed Moneeb Elsabagh**

Date:

Extrusion analysis		•	•		•		•			•	•	•	•	•	•	
Wire drawing analysis		•	•	•	•		•		•	•		•	•	•	•	
Tube drawing analysis		•			•		•			•				•	•	
Deep drawing analysis		•	•	•	•		•		•	•	•	•	•	•	•	

Learning Method /ILO Matrix

Learning Method	a1	a2	a3	a4	b1	b2	b3	b4	c1	c2	c3	c4	d1	d2	d3	d4
Lectures	•	•	•	•	•	•	•									
Tutorials	•	•	•	•		•	•		•	•	•		•	•	•	

Assessment Methods /ILO Matrix

Assessment Method	a1	a2	a3	a4	b1	b2	b3	b4	c1	c2	c3	c4	d1	d2	d3	d4
Assignments	•	•	•	•	•	•	•		•		•	•	•			
Two Quizzes					•	•	•				•					
Written mid Exam	•	•			•				•			•		•		
Final Exam		•	•	•	•		•			•	•					

Course Coordinator: **Prof. Moustafa Chaaban**

Head of Department: **Prof. Ahmed Moneeb Elsabagh**

Date:

Course specifications of

Marketing and Engineering Management- HUM x21

University: Ain Shams **Faculty: Engineering**

Program on which the course is given: B.Sc. in Mechanical Engineering
Major or minor element of program : N.A.
Department offering the program : Design and Production Engineering

Department offering the course: Design and Production Engineering

Academic year/ Level: 3rdyear, Second semester
Date of specification approval:

A- Basic Information

Title:	Marketing and Engineering Management	**Code:**	HUM X21
Credit Hours:	**N.A.**	**Lecture:**	2
Tutorial :	1	**Practical:**	0
Total:	3		

B- Professional Information

1- Overall aims of course

By the end of the course the students will be able to:

- Identify and evaluate the fundamental concepts and theories of marketing.
- Describe the variables, techniques, and the processes used to segment markets.
- Develop a critical understanding of the role of marketing in a firm's overall strategy;
- Develop Product and Pricing Strategy; types of marketing channels; Distribution and Promotion Strategies.
- Demonstrate knowledge and understanding of the term Engineering Management.
- Introduce engineers to the ways in which management principles are applied in their field of practice.
- Recognize the different types of management techniques, organizations and activities.
- Apply management topics as tools with which to achieve engineering solutions.
- Understand the special professional obligations that engineers and engineering managers have as they serve the public good.
- The student shall attain the above mentioned objectives efficiently under controlled guidance and supervision while gaining the experience through the introduction of case studies that illustrate the techniques described in the course.

2- Intended learning outcomes of course (ILOs)

a. Knowledge and understanding

a_1- Identify the concepts of marketing:
a_2-Describe the marketing functions:
a_3-Explain how to apply the key frameworks and tools for analyzing customers, competition, marketing positioning, and marketing strengths and weaknesses.
a_4-Select market segmentation.
a_5- Analyze Marketing Mix: Identify the stages of the product life cycle; components of industrial and consumer markets.
a_6-Distinguish Marketing Channels (Advertising, Direct Marketing, Public Relations such as Sponsorships, Social Events, etc.).
a_7- Define the fundamentals of management ,of the engineering profession and their interaction..
a_8-Define technical projects;leadership,planning,scheduling and control techniques.
a_9-Identify of different organization structures.
a_{10}- Identify human aspects such as motivation, leadership, personnel development, employee recognition, and communication.
a_{11}-Explain how to maintain technical competence of the employees subordinate to the engineering manager.

b. Intellectual skills

b_1- Differentiate between sales and marketing
b_2- Appreciate the need for marketing planning.
b_3-Analyze the variables, techniques, and the processes used to segment markets.
b_4- Develop Product and Pricing Strategy; types of marketing channels; Distribution and Promotion Strategies.
b_5- Describe and integrate the relationships among the elements of the marketing mix.
b_6- Illustrate how marketing concepts and theories may be applied in the business world.
b_7-Improve employees performance through motivation and personnel development activities.
b_8-Assess approaches to manage people and organizations.
b_9- Assess means of communication and human relations within an engineering organization.

c. Professional and practical skills

c_1-Introduce the nature and basic concepts of marketing.
c_2- Expose students to applications of marketing principles in the real world, and equip them with the skills to develop a simple marketing plan.

c_3- Develops an essential foundation for those planning to continue with more advanced marketing coursework and gives an overview to those who will take only one marketing course.

C4-Identify intra- and extra organizational entities with which the engineer is likely to deal.

C5-Deal with professional terms such as negotiation, delegation , designing for formal and informal meetings, motivation theories and incentives.

C6-Create, maintain and evaluate effective organizations.

d. General and transferable skills

d_1-Conduct oral and written presentations.

d_2-Practice working in a team to develop communication skills.

d_3-Creative thinking through case studies, assignments, classroom discussions.

d_4- Adaptability to change through case studies and examinations.

3- Contents

No	Course Content	Lecture	Tutorials	Total
1	Introduction to marketing	2	2	4
2	Market segmentation positioning	4	2	6
3	Marketing plan	2	2	4
4	Marketing mix: product& pricing	6	2	8
5	Marketing mix: place& promotion	6	2	8
6	Introduction to Engineering Management	3	1	4
7	The Engineering Organization	2	2	4
8	The human Element in Engineering Management	3	1	4
9	Communication in the Engineering Organization	2	1	3
	Total Hours	30	15	45

4- Assessment schedule

Assessment method	No	Description	Week No	Weight (%)
Assignment	1	Assignment 1	3	1
Assignment	2	Assignment 2/Report 1	5	3
Written exam	3	Midterm exam	7	15
Assignment	4	Assignment 3	9	1
Written exam	5	Quiz	10	5
Report	6	Report 2	11	3
Assignment	7	Assignment 4	12	2
Written exam	8	Final exam	16	70
Total				100 %

5- List of references

5. 2 Essential books (text books)

1- W. D. Perreault, Jr. and E. J. McCarthy, Basic Marketing: A Global-Managerial Approach, 14th ed., Irwin/McGraw-Hill.
2- Marketing: Concepts and Strategies, Pride & Ferrell, Houghton Mifflin, 12th ed.
3- Kotlers, Marketing Management, Prentice Hall, London, 1999.
4- F. LauranceBennett,P.E., "The Management of Engineering", John Wiley &Sons,Inc. , 1996
5- Daniel L. Babcock, "Managing Engineering and Technology", Prentice-Hall,Inc.,1996, 2nd Ed.1968

- **Philip Kotler, 2002 ,Framework for Marketing Management,** ISBN-10: 0131001175, ISBN-13: 9780131001176, Publisher: Prentice Hall

- **Philip Kotler, Gary Armstrong,2013, Marketing : An Introduction** Eleventh Edition (Global Edition) ISBN 978-013-61- 243- 4, Publisher: Prentice Hall

5. 3 Recommended books

1- Brassington, F. &Pettitt, S. (2003) 'Principles of Marketing.' 3rd ed., London, Pitman Publishing.
2- Stephen P. Robins,David A. DeCenzo," Fundamentals of Management", Pearson Prentice Hall, 2005, 5th Ed.

5. 4 Periodicals, Web sites … etc.

http://www.bamboweb.com/articles/t/a/marketing
http://www.businessknowhow.com/marketing

6- Facilities required for teaching and learning

Course Coordinator: Prof.Dr. Nahid Afia

Head of Department: Prof. Dr. HeshamAbd El Hamed Sonbol

Date:

- Appropriate teaching class accommodations including presentation board and data show.

Course Content/ILO Matrix

Course Content	a1	a2	a3	a4	a5	a6	a7	a8	a9	a10	b1	b2	b3	b4	b5	b6	b7	b8	b9	c1	c2	c3	c4	c5	c6	d1	d2	d3	d4
Introduction to marketing	●		●								●	●	●							●						●			
Market segmentation and positioning				●																	●	●					●	●	●
Consumer behavior			●															●											
Marketing mix					●	●								●	●														
Marketing ethics							●								●														
Introduction to engineering management								●		●						●							●						
Development of engineering management		●								●							●												
The organization structure	●																●												
The human element in engineering management																			●					●	●				
Communication in organizations					●				●	●				●															

Course Coordinator: Prof.Dr. Nahid Afia

Head of Department: Prof. Dr. HeshamAbd El Hamed Sonbol

Date:

Learning Method/ILO Matrix

Learning Methods	a1	a2	a3	a4	a5	a6	a7	a8	a9	a10	b1	b2	b3	b4	b5	b6	b7	b8	b9	c1	c2	c3	c4	c5	c6	d1	d2	d3	d4
Lectures	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			
Tutorials	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●							●	●

Assessment Methods/ILO Matrix

Assessment	a1	a2	a3	a4	a5	a6	a7	a8	a9	a10	b1	b2	b3	b4	b5	b6	b7	b8	b9	c1	c2	c3	c4	c5	c6	d1	d2	d3	d4
Assignments	●	●	●	●							●	●	●	●		●	●					●	●	●	●	●	●	●	●
Midterm Exam	●	●	●	●	●						●	●	●							●	●								

Course Coordinator: Prof.Dr. Nahid Afia

Head of Department: Prof. Dr. HeshamAbd El Hamed Sonbol

Date:

Course Coordinator: Prof.Dr. Nahid Afia

Head of Department: Prof. Dr. HeshamAbd El Hamed Sonbol

Date:

Course specifications of

Quality Control - MDP 422

University: Ain Shams   Faculty: Engineering

Programme on which the course is given	B. Sc. in Production Engineering
Major or minor element of programme	N.A.
Department offering the programme	Design and Production Engineering
Department offering the course:	Design and Production Engineering
Academic year/ Level:	Fifth year/First semester
Date of specification approval:	

A- Basic Information

Title:	Quality Control	**Code:**	MDP-422
Credit Hours:	N.A.	**Lecture :**	2
Tutorial:	2	**Practical**	**Total:** 4

B- Professional Information

1 – Overall aims of course:

By the end of the course the students will be able to:

- Demonstrate knowledge and understanding of the different quality control tools.
- Introduce students to both qualitative and quantitative information and techniques to arrive at economical and socially responsible solutions..
- Reason critically, both individually and collaboratively, draw sound conclusions from information, ideas, and interpretations gathered from various sources and disciplines
- Apply those conclusions to the solutions of real-world engineering problems.

2- **Intended learning outcomes of course (ILOs)**

a- Knowledge and understanding

a1 - Provide an introduction to the fundamental concepts of statistical process control, total quality management, six sigma and the application of these concepts, philosophies, and strategies to issues arising in government and industry.

a2 - Enhance the student's understanding of the complexities of statistical analysis and control-chart interpretation and their work-place application.

a3 - Provide skills in diagnosing and analyzing problems causing variation in manufacturing and service industry processes.

a4 - Provide a basic understanding of "widely-used" quality analysis tools and techniques. Create an awareness of the quality management problem solving techniques currently in use.

b- Intellectual skills

- b1 - Improve students understanding of statistical tools and their application.
- b2 - Assess approaches to analyze different problems and statistical experiments.
- b3 - Assess means of analyzing quality problems within the organization, thus maintaining high quality and market superiority.

c- Professional and practical skills

- c1 - Identify the different quality analysis tools with which the engineer is likely to
- c2 - deal. Deal with professional terms such as presentation of data, hypothesis sampling and control charts.
- c3 - Create effective work area.

d- General and transferable skills

- d1 - Conduct oral and written presentations.
- d2 - Practice working in a team to develop communication skills.

3- Contents:

No	Course Content	Lectures	Tutorials	Total
1	Introduction	2	2	4
2	Presentation and description of data	2	2	4
3	Theory of probability	2	2	4
4	Discrete probability distributions	2	2	4
5	Continuous probability distributions	2	2	4
6	Sampling distributions	2	2	4
7	Estimation theory	2	2	4
8	Testing hypothesis	2	2	4
9	Regression and correlation analysis	2	2	4
10	Process capability analysis	2	2	4
11	Theory of control charts	2	2	4
12	Control charts for variables	2	2	4
13	Control charts for attributes	2	2	4
14	Acceptance sampling: Principles and concepts	2	2	4
15	Acceptance sampling by attributes	1	1	2
16	Acceptance sampling by variables	1	1	2
	Total Hours	30	30	60

4- Assessment schedule:

Assessment Method	No	Description	Week No.	Weight (%)
Assignments	1	Assignment 1	Week 3	1
Report	2	Report 1	Week 5	2
Exam	3	Mid Term	Week 7	15
Assignment	4	Assignment 2	Week 9	2
Exam	5	Quiz	Week 10	5
Report	6	Report 2	Week 11	3
Assignment	7	Assignment 3	Week 12	2
Exam	8	Final Exam	Week 16	70
Total				100 %

5- List of references

5.1 Essential books (text books)

- Grant,E.L.,"Statistical Quality Control", McGraw Hill, New York, 1996.
- Motgomery, D. C., "Introduction to Statistical Quality Control", John Wiley and Sons, N.Y., 1997.

5.2 Periodicals, Web sites, … etc

- www.ASQ.org

6- Facilities required for teaching and learning

- Appropriate teaching class accommodations including presentation board and data show.

Course Coordinator: Prof. Dr. Adel M. Mahmoud
Head of Department: Prof. Dr. Hesham Senbel
Date:

Course Content /ILO Matrix

Course Content	a1	a2	a3	a4	b1	b2	b3	c1	c2	c3	d1	d2
Introduction	●	●	●									
Presentation and description of data		●		●	●	●						
Theory of probability		●	●	●								
Discrete probability distributions				●				●	●			
Continuous probability distributions					●							
Sampling distributions			●			●		●				
Estimation theory							●		●			
Testing hypothesis				●			●			●		
Regression and correlation analysis				●			●				●	●
Process capability analysis						●		●				
Theory of control charts				●					●			
Control charts for variables			●		●					●		
Control charts for attributes							●			●		
Acceptance sampling: Principles and concepts					●	●						
Acceptance sampling by attributes				●		●		●				
Acceptance sampling by variables			●	●		●	●			●		

Learning Method /ILO Matrix

Course Content	a1	a2	a3	a4	b1	b2	b3	c1	c2	c3	d1	d2
Lectures	●	●	●	●	●	●	●	●	●	●		
Tutorials	●	●	●	●	●	●	●	●	●	●	●	●

Course Coordinator: Prof. Dr. Adel M. Mahmoud
Head of Department: Prof. Dr. Hesham Senbel
Date:

Assessment Methods /ILO Matrix

Course Content	a1	a2	a3	a4	b1	b2	b3	c1	c2	c3	d1	d2
Assignments: Assignment 1	●	●										
Reports: Report 1		●				●					●	
Written Exam: Mid-term			●			●						
Assignments: Assignment 2			●						●			
Written Exam: Quiz				●				●				
Reports: Report 2					●		●			●		●
Assignments: Assignment 3									●			
Written Exam: Final Exam			●					●				

Course Coordinator: Prof. Dr. Adel M. Mahmoud
Head of Department: Prof. Dr. Hesham Senbel
Date:

Course specifications of

Facilities Planning - MDP 423

University: Ain Shams **Faculty: Engineering**

Programme on which the course is given	B. Sc. in Mechanical Engineering (Production)
Major or minor element of programme	N.A.
Department offering the programme	Design and Production Engineering
Department offering the course :	Design and Production Engineering
Academic year/ Level :	Fifth year/Second semester
Date of specification approval :	11/24/2007

A- Basic Information

Title :	Facilities Planning	**code :**	MDP-423
Credit Hours :	N.A.	**Lecture :**	3
Tutorial :	2	**Practical**	**Total:** 5

B- Professional Information

1 – Overall aims of course

By the end of the course the students will be able to:

- Demonstrate knowledge and understanding of facilities layout and materials handling systems and equipment.
- Identify the different types of layouts and its data and information required in the field.
  Recognize and formulate the flow of materials and the distance traveled between locations.
  Identify the appropriate technique to handle the problem of layout.
- Solve and analysis the results obtained.
- Identify the appropriate types of handling equipment to use.
- Analysis the site data and derive the solution for selecting the best site location.

2- Intended learning outcomes of course (ILOs)

a-Knowledge and understanding

a1 - identify types of the data and techniques of facilities planning.

a2 - Formulate models for the different types of layouts.

a3 - Select the technique(s) to solve the model.

a4 - Calculate materials handling cost associated with layouts obtained and compare between different solutions in terms of objective(s) considered.

a5 - Select the most appropriate equipment for handling materials and parts, and calculate the number required for the production and/or handling situations.

b-Intellectual skills

- b1 - Analyze and select the most appropriate format of layouts for the situation.
- b2 - Analyze and select the most appropriate equipment for the situation.
- b3 - Evaluate the solutions obtained and select the layout that meet the objective(s) for the situation.
- b4 - Suggest alternative solutions and evaluate the new proposals.
- b5 - Analyze the site locations.

c-Professional and practical skills

- c1 - Identify data and structure of facilities layout and materials handling.
- c2 - Manipulate the problem of site selection.
- c3 - Recognize the interaction of facilities layout with the overall performance of production and service industries.
- c4 - Identify the situations that could lead to layout problems. Appreciate
- c5 - Identify the effect of handling on the production costs as a whole.
- c6 - Use the internet to obtain data and information about the subject and related ones.

d-General and transferable skills

- d1 - Present the problem and solutions of facility layout.
- d2 - Write technical reports and conduct presentation of the problem and its solution techniques and its relationships with the other production of service activities.
- d3 - Present the results of Internet search in professional patterns.

3- Contents

No	Course Content	Lecture	Tutorial	Total
265	Identify Requirements. Basic Layout Formats	3	1	4
266	Activity Relationship Chart. Measuring Flow	3	1	4
267	Space requirements	3	2	5
268	Techniques for solving the problem	3	2	5
269	Computer Aided Layout	3	3	6
270	Single facility Location Problem Location Allocation models and LP models	4	2	6
271	Office layout and personal requirements	2	2	4
272	Facilities services (Light, Ventilation..)	2	3	5
273	Site Selection.	2	2	4
274	The material handling Equation	4	2	6
275	Different types of handling equipment	4	2	6
276	Determination of the number of equipment	4	2	6
277	Conveyors calculations	2	2	4
278	Carousel calculations	2	2	4
279	Different types of Warehouse layouts	4	2	6
	Total Hours	45	30	75

4- Assessment schedule

Weight (%)	Week No	Description	No	Assessment method
1	Week 3	Assignment 1		Assignment
1	Week 6	Assignment 2		Assignment
1	Week 7	Assignment 3		Assignment
2	Week 8	Quiz 1		Quiz
10	Week 9	Mid term		Mid-term Exam
12	Week 12	Report 1		Project Report
73	Week 15	Final exam		Final Exam
100 %	Total			

Course Coordinator: Dr. Ahmed Mahmoud Aly
Head of Department: Prof. Ahmed Moneeb Elsabaagh
Date: / /

5- List of references

5. 1 Course notes

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5. 2 Essential books (Text books)

- Francis, R.L. McGinnis, L.F. and White J.A., Facilities Layout and Location: An Analytical Approach, Prentice Hall, Englewood Cliff, NJ,1992.
- 2- Tompkins, J.A, et al, facilities Planning, John Wiley & Sons, Inc, N.Y., 2002.

5. 3 Recommended books

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5. 4 Periodicals, Web sites, etc.

- www.iie.org Management Science.
- International Journal of Production. Research.
- Computers and IE
- AIIE

6- Facilities required for teaching and learning

Appropriate teaching class accommodations including presentation board and data show

Computer Lab

Course Coordinator: Dr. Ahmed Mahmoud Aly

Head of Department: Prof. Ahmed Moneeb Elsabaagh

Date: / /

Course Content/ILO Matrix

Course Content	a1	a2	a3	a4	a5	b1	b2	b3	b4	b5	c1	c2	c3	c4	c5	c6	d1	d2	d3
Identify Requirements. Basic Layout Formats																			
Activity Relationship Chart. Measuring Flow																			
Space Requirements																			
Techniques for solving the problem																			
Computer Aided Layout																			
Single facility Location Problem Location Allocation models and LP models																			
Office layout and personal requirements																			
Facilities services (Light, Ventilation..)																			
Site Selection.																			
The material handling Equation Different																			
types of handling equipment																			
Determination of the number of equipment																			
Conveyors calculations																			
Carousel calculations																			
Different types of Warehouse layouts																			

Learning Method /ILO Matrix

Learning Objectives	d3	d2	d1	c6	c5	c4	c3	c2	c1	b5	b4	b3	b2	b1	a5	a4	a3	a2	a1
Lecture																			
Tutorial																			

Course Coordinator: Dr. Ahmed Mahmoud Aly

Head of Department: Prof. Ahmed Moneeb Elsabaagh

Date: / /

Assessment Methods /ILO Matrix

Assessment	d3	d2	d1	c6	c5	c4	c3	c2	c1	b5	b4	b3	b2	b1	a5	a4
Assignment 1																
Assignment 2																
Assignment 3																
Quiz 1																
Mid- Term																
Report 1																
Final Exam																

Course Coordinator: Dr. Ahmed Mahmoud Aly
Head of Department: Prof. Hesham Aly Abdehameed Sonbol
Date: / /

Course specifications of

Operations Management - MDP 424

University: Ain Shams **Faculty: Engineering**

Programme on which the course is given	Design and Production Engineering
Major or minor element of programme	N.A.
Department offering the programme	Design and Production Engineering
Department offering the course:	Design and Production Engineering
Academic year/ Level:	Fifth year
Date of specification approval:	11/24/2007

A- Basic Information

Title:	Operations Management	**Code:**	MDP-424		
Credit Hours:	N.A.	**Lecture:**	3		
Tutorial:	2	**Practical:**	0	**Total:**	5

B- Professional Information

1 – Overall aims of course

By the end of the course the students will be able to:

- Demonstrate knowledge on production planning and control systems in industrial environment
- Develop mathematical models describing actual and hypothetical production systems to the optimal utilization of resources
- Solve production and operation management problems
- Work in teams to formulate and solve real life case studies

2- Intended learning outcomes of course (ILOs)

a-Knowledge and understanding

a1 - Understand the different sources of qualitative forecasts and know how to apply the mathematical methods used in forecasting.

a2 - Understand the concepts of aggregate planning and the use of different techniques including linear programming models in determining optimal resource allocations

a3 - Appreciates the strategies available for aggregate planning and the different models that can be used for decision making

a4 - Understand the flow of material through a production system from purchasing to finished goods inventory

a5 - Be able to calculate economic lot sizes using EOQ, EPQ and risk models

- a6 - Be aware of expedient inventory methods, ABC analysis, and perpetual and period inventory management systems
- a7 - Realize the importance of systems thinking and how material management interacts with the rest of the production system
- a8 - Understand the philosophy of JIT and the nature of Kanban . Realize the significant impact that JIT applications have had on production management
- a9 - Be able to distinguish the features of pull- and push- manufacturing systems
- a10 - Know how to use critical ratios to set priorities, Gantt chart for scheduling and monitoring.

b-Intellectual skills

- b1 - Analyze the components of the production system and evaluate the sufficiency of resources.
- b2 - Improve capability in formulating industrial production planning and control problems.
- b3 - Improve capability in using computer for solving problems.

c-Professional and practical skills

- c1 - Apply different mathematical methods and operation research techniques in solving practical case studies.

d-General and transferable skills

- d1 - Improve team work skills through term projects
- d2 - Improve report writing and presentation skills

3- Contents

Topic	No. of hours	Lecture	Tutorial/Practical
Introduction to Production/Operation Management	6	6	--
Forecasting and Time Series Analysis	11	6	5
Resource Requirement Planning	7	5	2
Inventory Policy and Management	13	7	6
Aggregate Production Planning and Master Scheduling	12	6	6
Material Requirements Planning	11	6	5
Just In Time Systems	4	3	1
Operation Scheduling and Production Control	11	6	5
Total Houses	70	45	30

4– Teaching and Learning Methods

4.1- Lectures
4.2- Assignments
4.3- Case studies
4.4- Team term project

5- Student Assessment Methods

5.1 Exams to assess students' understanding and ability to apply what they have learnt.
5.2 Quizzes
5.3 Case studies
5.4 term project

Assessment Schedule

Assessment 1	Assignment 1	2rd Week
Assessment 2	Assignment 2	5th Week
Assessment 3	Quiz 1	7th Week.
Assessment 4	Assignment 3	8th Week
Assessment 5	Mid-term exam	9th Week
Assessment 6	Quiz 2	9th Week
Assessment 7	Assignment 4	10th Week
Assessment 8	submission of the Case study report	11th Week
Assessment 9	Assignment 5	12th Week
Assessment 10	Quiz 3	12th Week
Assessment 11	Assignment 6	13th Week
Assessment 12	Final exam	15th Week

Weights of Assessments

Mid-Term Examination	15
Final-term Examination	90
Oral Examination	
Practical Examination	
Semester Work	20
• Assignments	5
• Quizzes	5
• Case Study	5
• Attendance	5
Other types of assessment	
Total	125

5- List of references

5. 1 Course notes

- ---- ---- ----

5. 2 Essential books (text books)

- William J. Stevenson," Production/Operation Management" McGraw-Hill, seven edition, 2002.

5. 3 Recommended books

- Jams L. Riggs," Production Systems: Planning, Analysis and Control" John Will.
  James R. Evans, etl, "Applied Production and Operation Management", West Publishing.

5. 4 Periodicals, Web sites, etc

- ---- ---- ----

6- Facilities required for teaching and learning

- Computer lab

Course Coordinator: Prof. Dr. Amin Kamel El-Kharbotly

Head of Department: Prof. Dr. Hesham Abd El Hammed Sonbal

Date: 01/02/2017

Course specifications of

Computer Applications in Industry - MDP 427

University: Ain Shams **Faculty: Engineering**

Program on which the course is given	B. Sc. in Mechanical Engineering, Production Section
Major or minor element of program	N.A.
Department offering the program	Design and Production Engineering
Department offering the course :	Design and Production Engineering
Academic year/ Level :	Fifth year/First semester
Date of specification approval :	

A- Basic Information

Title :	Computer Applications in Industry	**code :**	MDP-427
Credit Hours :	N.A.	**Lecture :**	2
Tutorial :	2	**Practical**	**Total:** 4

B- Professional Information

1 – Overall aims of course

By the end of the course the students will be able to:

- Acquainted with the different techniques of effective using of computer in manufacturing.
- Use of modern tools, and applications programs commonly used in CAM
- Acquainted with the different CAD data representation
- Understand the fundamental concepts of computer assisted CNC programming
- Acquainted with the different sensors and transducer
- Develop a process plan for a real case study
- Plan a production facility for a real case study

2- Intended learning outcomes of course (ILOs)

a-Knowledge and understanding

a1- Describe the different applications of computers in industry
a2- Identify the Different CAD data representation and different neural files
a3- Explain the Fundamental concepts of computer assisted CNC programming
a4- Explain the concepts of computer aided process and production planning
a5- Describe the different sensors and transducer concept
a6- Know the concept of rapid prototyping

b-Intellectual skills

- b1 - Choose a suitable sensors for different applications
- b2 - Choose an appropriate CAD data representation for different applications
- b3 - Establish a complete plan for a case study
- b4 - Write CNC part program using computer assisted language

c-Professional and practical skills

- c1 - Use appropriate lab sensors and transducers
- c2 - Design an experiments in the sensors lab
- c3 - Use different CAM application softwares

d-General and transferable skills

- d1 - Write technical report according the scientific standards guideline
- d2 - Present the different knowledge concepts through a report in oral seminar
- d3 - Work as a part of a team in process and production planning group for a real case study

3- Contents

No	Course Content	lectures lectures	tutorials	Total
1	CAD data representation	2	2	4
2	Group Technology	2	2	4
3	Computer Aided Process Engineering	2	2	4
4	Computer Aided Process Planning (CAPP)	2	2	4
5	Computer Assisted NC Part Programming	4	6	10
6	Computerized Machinability Data	2	2	4
7	Computer Aided Line Balancing	2	2	4
8	Computer Aided Production Planning	2	2	4
9	Sensors and Data acquisition	2	2	4
10	Computerized Process Control	4	2	6
11	Computerized Quality Control	2	4	6
12	Rapid prototyping	4	2	6
	Total Hours	30	30	60

Course Coordinator: Dr. Mohamed Ahmed Awad

Head of Department: Prof.Dr. Hesham Senbel

Date: / /

4- Assessment schedule

Assessment method	No	Description	Week No	Weight (%)
assignments	1	ass 1	Week 3	2
assignments	2	ass 2	Week 5	2
Written exams	3	mid term	Week 7	10
assignments	4	ass 3	Week 9	2
Written exams	5	quiz	Week 10	2
reports	6	report	Week 11	10
assignments	7	ass 4	Week 12	2
Written exams	8	final	Week 16	70
Total				100 %

5- List of references

5. 1 Course notes

- Course lecture notes will be distributed during lectures

5. 2 Essential books (text books)

- Thomas O. Boucher, Computer Automation In Manufacturing An Introduction, Chapman & Hall, 1996
  2-Galip Ulsoy and Warren R., Microcomputer Applications In manufacturing, John Wiley & Sons, 1989
  3-Andrew Kusiak, Intelligent Manufacturing Systems, Pre

6- Facilities required for teaching and learning

Appropriate teaching class accommodations including; data show, presentation board and white board

Sensor lab, CAM lab and CNC lab equipped with normal equipments

Course Coordinator: Dr. Mohamed Ahmed Awad

Head of Department: Prof.Dr. Hesham Senbel

Date: / /

Course Content/ILO Matrix

Course Content	a1	a2	a3	a4	a5	a6	b1	b2	b4	c1	c2	c3	d1	d2	d3
CAD data representation	●	●	●												
Group Technology	●	●	●										●		
Computer Aided Process Engineering				●				●						●	
Computer Aided Process Planning (CAPP)				●				●							●
Computer Assisted NC Part Programming	●	●	●					●	●						
Computerized Machinability Data	●	●						●					●		
Computer Aided Line Balancing	●							●						●	
Computer Aided Production Planning	●							●							●
Sensors and Data acquisition					●		●			●	●		●		
Computerized Process Control												●		●	
Computerized Quality Control												●			
Rapid prototyping						●						●			●

Learning Method /ILO Matrix

Learning Method	a1	a2	a3	a4	a5	a6	b1	b2	b4	c1	c2	c3	d1	d2	d3
Lecture	●	●	●	●	●	●	●	●	●						
Tutorials	●	●	●	●	●		●	●	●	●	●	●			
Workshop													●	●	●

Course Coordinator: Dr. Mohamed Ahmed Awad

Head of Department: Prof.Dr. Hesham Senbel

Date: / /

Assessment Methods /ILO Matrix

Assessment	a1	a2	a3	a4	a5	a6	b1	b2	b4	c1	c2	c3	d1	d2	d3
assignments : ass 1	●	●	●	●				●							
assignments : ass 2	●	●	●	●				●	●						
Written exams : mid term	●	●	●	●				●	●						
assignments : ass 3	●							●							
Written exams : quiz	●				●		●	●		●	●				
reports : report													●	●	●
assignments : ass 4												●			
Written exams : final	●	●	●	●	●	●	●	●	●						

Course Coordinator: Dr. Mohamed Ahmed Awad

Head of Department: Prof.Dr. Hesham Senbel

Date: / /

Course specifications of

Ergonomics - MDP 428

University: Ain Shams **Faculty: Engineering**

Program on which the course is given	B. Sc. in Design & Production Engineering
Major or minor element of program	N.A.
Department offering the program	Design & Production Engineering
Department offering the course:	Design & Production Engineering
Academic year/ Level:	Fifth year/First semester
Date of specification approval :	

A- Basic Information

Title :	Ergonomics	**code :**	MDP-428		
Credit Hours	N.A.	**Lecture :**	2		
Tutorial :	2	**Practical**	0	**Total:**	4

B- Professional Information

1 – Overall aims of course

By the end of the course the students will be able to:

- Know the role of ergonomist in the society and industrial organizations.
- Apply ergonomics principles to the different design problems.
- Be able to explain the basic human system of cognition and perception (vision, hearing,….etc.) and how that affects engineering design.
- Design displays and controls.
- Design the workspace and related environmental parameters.
- Specify designs that avoid occupation - related injuries
- Design human computer interfaces for information processing and control.
- Design the manual and physical handling tasks.
- Evaluate related material on the internet as to credibility and accuracy.
- Utilize the available ergonomics knowledge to improve industrial efficiencies, avoid accidents and injuries.

2- Intended learning outcomes of course (ILOs) a-Knowledge and understanding

a1- Explain the capabilities and limitations of human performance.
a2- Know the comprehensive background of human factors in design
a3- Know knowledge to conform with ergonomics legislation.
a4- state psychological and physiological factors that lead to successful applications. a5- Know what information is necessary and sufficient for the design context.

b- Intellectual skills

b1- Optimize the human task environment systems.

b2- Apply both psychology and engineering principles to solve human related industrial problems.
b3- Optimize the interactions between the user and the working environment.

b4- Reach efficient user-system interfaces originated from the design.
b5- Realize linkage between psychology and engineering.

b6- Links theories of human performance with real-world from an engineering oriented perspective. b7- Learn research methods.

b8- Apply knowledge of math., science, economics and engineering principles to solve engineering design problems.

b9- Use appropriate techniques, skills and tools to identify, formulate, analyze and solve engineering design problems.
b 10-TRIZ and brain storming methodology were given to create innovative ideas and concepts in ergonomics.

c-Professional and practical skills

c1- Design for human factors "jobs, machines, operations, environments and work systems compatible with human capabilities and limitations".

c2- Act as engineering psychologist.

c3- Match the functionality of the technology to the task requirements and human capabilities
c4- Design for comfortable use.

c5- Design experience "economical, ethical, and societal".

c6- Know how to choose constructively critique.

c7- Design human tasks for minimal stress and maximum performance.

d-General and transferable skills

d1- Interact between humans and their environment, be it with technology or social structure, at work or at real life.

d2- Improve health, safety, efficiencies and performance records d3- Operate and maintaining in a cost effective way.

d4- Work as a team.

d5- Identify opportunities for system improvement.

3- Contents:

No.	Course Content	Lectures	Tutorials	Total
1	Introduction & Research Methods	2		2
2	Design & Evaluation Methods	2	4	6
3	Visual, Auditory and cognition	2	2	4
4	Controls	4	8	12
5	Engineering Anthropometry	2	4	6
6	Work space design	4	6	10
7	Cumulative trauma disorders	2		2
8	Biomechanics at work	2		2
9	Work physiology, stress and work load	2		2
10	Environmental design	2	2	4
11	Safety, accidents and human error	2		2
12	Human-computer interaction	2	2	4
13	Automation	2	2	4
	Total Hours	30	30	60

4- Assessment schedule

Assessment method	No	Description	Week No	Weight (%)
Assignments	1	Ass 1	Week 2	3
Assignments	2	Ass 2	Week 3	3
Written Exams	3	Mid-term	Week 4	10
Assignments	4	Ass3	Week 5	3
Written Exams	5	Quiz	Week 6	5
Reports	6	Report	Week7	3
Assignments	7	Ass 4	Week 13	3
Written Exams	8	Final exam	Week 16	70
Total				100 %

5- List of references

5. 1 Course notes

- Course notes

5. 2 Essential books (text books)

- Human factors in Engineering and Design
  Ernest J. Mc Cormick and Mark S. Sander
  Mc Graw Hill
- Introduction to Ergonomics
  By: Robert Bridger
  ISBN 0415273781 Publisher:
  CRC press Publication Date:
  04/10/2003
- Introduction to Human Factors Engineering
  2nd. Edition - Christopher Wickens, John Lee, Yli Liu, SallieGordon-Becker

5. 3 Periodicals, Web sites, … etc

- www.ergonomics 4 schools.com
- www.osha.com
- www.felby.com ergonomics products
- www.cdc.gov/
- www.engineering.viowa.edu
- www.iosh.co.uk
- www.osha.gov
- www.iea.cc/
- www.me.berkelly.edu/ergo/
- www.hse.gov.uk/pubns/ergonomics.htm
- www.hse.gov.uk/pubns/
- www.abakusv.com/abakus/indes.html
- www.1.va.gov/vasafety/doc/wc-equipment-layout-(ergo)2003.ppt.

6- Facilities required for teaching and learning

- Appropriate teaching class accommodations including presentation board and data show.

Course Matrix

Course content	a1	a2	a3	c4	a5									b9	c1		c3	c4	c5	c6	c7	d1	d2	d3	d4	d5
MethodsResearch &Introduction	●		●				●													●						
&Design Evaluation Methods		●	●									●			●							●	●			●
cognition&AuditoryVisual,			●	●								●							●							
Controls			●	●			●	●				●						●								
DesignspaceWork					●			●				●			●	●						●				
Biomechanics workat								●							●	●				●					●	
work&stressphysiology,Work load									●					●							●			●		●
Environmental design					●	●		●									●				●		●			●
errorhuman&accidentsSafety,							●			●						●					●					

Course Coordinator: Dr. Ahmed el Hamaky
Head of Department: Prof. Ahmed Moneeb Elsabaagh
Date:

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Learning Method	a1	a2	a3	a4	a5						b6				c1	c2	c3	c4	c5	c6	c7	d1	d2	d3	d4	d5
Lectures	●	●	●	●	●	• ●	●	●	●		●	• ●	●		●	●	●	●	●	●	●					
Tutorials		●	●	●	●	●			●			•			●			●	●	●		●	●	●	●	●

Assess ment /IL OM etho d Mat rix

Course content	a1	a2	a3	a4	a5	b3b2b1			b4				b9b8		c1	c2	c3	c4	c5	c6	c7	d1	d2	d3	d4	d5
1Assignment	●	●	●							●					●			●	●	●						
2Assignment			●	●						●							●	●	●							
Term-Mid	●	●	●	●		●	●	●		●																
3Assignment			●	●											●	●	●									
Quiz	●		●			●	●	●		●												●	●			
Report													●	●	●	●			●	●	●		●	●	●	●
4Assignment								●	●		●						●	●								
ExamFinal	●	●	●	●	●	●		●	●		●				●		●		●	●	●					

Course Coordinator: Dr. Ahmed el Hamaky
Head of Department: Prof. Ahmed Moneeb Elsabaagh
Date:

Course specifications of

Materials & Process Selection – MDP 431

University: Ain Shams **Faculty: Engineering**

Programme on which the course is given:	**Production Engineering B.Sc. Programme**
Major or minor element of programme:	N. A.
Department offering the programme:	Design & Production Engineering
Department offering the course:	Design and Production Engineering
Academic year/ Level:	4^{th} year, first term
Date of specification approval:	/ /

A- Basic Information

Title:	Materials & Process Selection	**Code:**	MDP 431
Credit Hours:	**N.A.**	**Lecture:**	2
Tutorial :	2	**Practical:**	0
Total:			4

B- Prerequisite Courses

Materials Engineering & Testing MDP 131

C- Professional Information

1- Overall aims of course

By the end of the course the students will be able to:

- Identify the behavior and processing of engineering materials.
- Discuss the effect of material properties on design.
- Discuss the effect of manufacturing process on design.
- Evaluate the economics of materials and manufacturing processes.
- Use the material selection charts.
- Discuss the concepts of material selection without shape.
- Discuss the concepts of material selection and shape selection.
- Apply a systematic procedure for materials and processes selection in mechanical design.

2- Intended learning outcomes of course (ILOs)

a. Knowledge and understanding

a1- Differentiate the behavior and processing of engineering materials: metals, polymers, ceramics and composites.
a2- Discuss the effect of material properties on design.
a3- Discuss the effect of manufacturing process on design.
a4- Identify the selection methods for materials and processes.

b. Intellectual skills

b1- Evaluate the economics of materials.

b2- Evaluate the economics of manufacturing processes.

c. Professional and practical skills

c1- Use the selection methods for materials and processes.

d. General and transferable skills

d1- Conduct presentation about materials selection.
d2- Practice working in a team to prepare the case studies.
d3- Write technical reports about the case studies.

3- Contents

No	Course Content	Lecture (hrs)	Tutorial (hrs)	Total (hrs)
1	Basic Concepts, Engineering Materials & Design Interactions.	4	4	8
2	The world of Engineering Materials, (Classification & properties).	4	4	8
3	Performance Maximizing Indices, (Material Selection Charts).	4	4	8
4	Material Selection Without Shape.	2	2	4
5	Formulization of Material Selection.	2	2	4
6	Material Selection and Shape, (Effect of Shape Factors).	4	4	8
7	Process Selection, (Process Selection Charts).	4	4	8
8	Case Studies.	6	6	12
	Total hours	30	30	60

Course Coordinator: **Dr. Ahmed Farid A.G. Youssef**

Head of Department: Prof. Dr. Hesham Senbel

Date: / /

4- Teaching and learning methods

4.1- Class Lectures.

4.2- Tutorials.

5- Student assessment methods

5.1- Assignments

5.2- Report and presentation

5.3- Mid-Term exam

5.4- Written final exam

6- Assessment schedule

Assessment method	No	Description	Week No	Weight (%)
Assignments		Assignments	5, 6, 7, 9	5
Report and presentation		Case Studies	12	15
Mid-term		Mid-term	8	10
Final written exam		Final exam	15	70
Total				100 %

7- List of references

a. Course notes

- Lecture Notes

[Complete Set of Lecture Notes, Report Requests, Assignments, Exercises, Solved Exercises, Previous Exams, and additional Course recourses on CD] are submitted to students in first lecture.

b. Essential books (text books)

- **M.F. Ashby, Materials Selection in Mechanical Design, Butterworth-Heinemann, 1992.**
- **Farag, M., Selection of Materials and Manufacturing Processes for Engineering Design, Prentice Hall, N.T, 1989.**

c. Reference books

- **M.F. Ashby, Materials Selection in Mechanical Design, Butterworth-Heinemann, 1992.**
- **Farag, M., Selection of Materials and Manufacturing Processes for Engineering Design, Prentice Hall, N.T, 1989.**

Course Coordinator: **Dr. Ahmed Farid A.G. Youssef**

Head of Department: Prof. Dr. Hesham Senbel

Date: / /

d. Periodicals, Web sites, … etc

www.Matweb.com   www.grantadesign.com   ASM Handbook Series

8- Facilities required for teaching and learning

- Appropriate teaching class accommodations including presentation board and data show

Course Content/ILO Matrix

Course Content	a1	a2	a3	a4	b1	b2	c1	d1	d2	d3
Basic Concepts, Engineering Materials & Design Interactions.	●									
The world of Engineering Materials, (Classification & properties).	●									
Performance Maximizing Indices, (Material Selection Charts).		●								
Material Selection Without Shape.			●							
Formulization of Material Selection.					●					
Material Selection and Shape, (Effect of Shape Factors).				●						
Process Selection, (Process Selection Charts).						●	●			
Case Studies	●	●	●	●	●	●	●	●	●	●

Learning Method /ILO Matrix

Course Content	a1	a2	a3	a4	b1	b2	c1	d1	d2	d3
Lecture	●	●	●	●	●	●	●			
Tutorial	●	●	●	●	●	●	●	●	●	●

Assessment Methods /ILO Matrix

Assessment	a1	a2	a3	a4	b1	b2	c1	d1	d2	d3
Assignments		●	●		●	●				
Report and presentation	●	●	●	●	●	●	●	●	●	●
Mid-term	●	●	●							
Final written exam				●	●	●	●			

Course Coordinator: **Dr. Ahmed Farid A.G. Youssef**

Head of Department: Prof. Dr. Hesham Senbel

Date: / /

Course Specifications of

Measurement – MDP 441

University: Ain Shams	Faculty: Engineering
Program on which the course is given	Production Program
Major or minor element of program	N/A
Department offering the Program	Design and Production Engineering
Department offering the course	Design and Production Engineering
Academic year/ Level	4th year Manufacturing Engineering
Date of specification approval	2013

A – Basic Information

Title	Measurement	Code	MDP 441
Credit Hours	N/A	Lecture	4 hours/Week
Tutorial/ Lab	4 hours/Week	Total	8 hours/Week

B- Professional Information

1- Overall aim of course

By the end of this course student will be able to:

1	Demonstrate understanding the different linear, angular and form measurement techniques
2	Demonstrate understanding of the different thread and gear measurement techniques
3	Demonstrate understanding of different geometrical errors assessment
4	Demonstrate understanding of different geometrical errors assessment
5	Demonstrate facility in using measuring instruments to carry out the machine acceptance test.
6	Demonstrate facility in using Metrology lab equipments and instruments to determine experimental outcomes.
7	Communicate concepts and experimental results in clear and logical fashion, both verbally and in writing.
8	Work with measuring instruments for individual, small group and large group projects.
9	The student shall attain the above mentioned objectives efficiently under controlled guidance and supervision while gaining the experience through application and analysis of realistic data.

1- Intended Learning Outcomes (ILOs)

a	**Knowledge and understanding**
a1	describe the different types of linear and angular measurement techniques
a2	describe the different thread measurement techniques

a3	describe the different gear measurement techniques
a4	describe the fundamental concepts of geometrical errors
a5	Identify all roundness and surface texture parameters
a6	List the new trend in measurement techniques
b Intellectual skills	
b1	Compare among different measuring techniques for different applications
b2	Choose the appropriate measuring techniques required for each specimen
b3	Analyze the roundness profile choosing the appropriate roundness parameters
B4	Analyze the surface profile choosing the appropriate roughness parameters
c Professional and practical skills	
c1	Use appropriate lab equipments
C2	Perform experiments in the metrology lab
C3	Setup the measuring instruments for sample measurements
d General and transferable skills	
d1	Write inspection report according the scientific standards guideline
d2	Present the inspection report in oral seminar
d3	Present the measuring characteristics in oral seminar
d4	Work as a part of a team in inspection project group for real case study

3 - Contents

Theory of measurements, Definitions, Errors, Linear measurements, Angle measurements.

No	Topic	Lecture	Tutorial	Total
1	Linear Measurements	4	4	8
2	Angular Measurements	4	4	8
3	Form Measurements	4	4	8
4	Thread measurements	12	8	20
5	Gear Measurements	8	8	16
6	Geometrical error measurement	8	12	20
7	Roundness measurements	4	4	8

8	Roughness measurements	8	6	14
9	Machine acceptance tests	4	4	8
10	new trend in measurement techniques	4	6	10
TOTAL HOURS		60	60	120

Teaching and learning methods

1	Class lectures
2	Tutorials
3	Experimental Laboratory work

List of experiments

No	Experiment Name	Hours
1	Linear Measurements	4
2	Angular Measurements	4
3	Form Measurements	4
4	Thread measurements	8
5	Gear Measurements	8
6	Geometrical error measurement	12
7	Roundness measurements	4
8	Roughness measurements	6
9	Machine acceptance tests	4
10	new trend in measurement techniques	6
	Total	**60**

4- Student assessment methods

1	Written exams (midterm/final)
2	Assignment
3	Study report

Assessment Method	No	Description	Week	Weight
Assignment		Assignment	Weekly	5
Report		Report	Weekly	5
Written Exam		Quiz 1	Week 4	2.5
Written Exam		Mid-term exam	Week 8	5
Written Exam		Quiz 2	Week 11	2.5
Lab Examination		Lab and Oral Exam	Week 14	20
Written exams		**Final Exam**	Week 15	60
		Total		100%

5. List of references

	Description	Details
5.1	Course notes	Distributed by the Author
5.2	References books	Gupta, R. C., Engineering Precision Metrology, Khanna Publishers, 1979
		Jain, Engineering Metrology, Khanna Publisher, 1999
5.3	Recommended Books	
5.4	Periodical, Web Sites	

6. Facilities required for teaching and learning

Appropriate teaching class hall/ Presentation board/ Data show.

Metrology lab equipped with computer stations

7- ILOS Matrices

Course Content / ILO Matrix

Course Content	a1	a2	a3	a4	a5	a6	b1	b2	b3	b4	c1	c2	c3	d1	d2	d3	d4
Linear Measurements	●						●	●			●	●	●	●			
Angular Measurements	●						●	●			●	●	●	●			
Form Measurements	●						●	●			●		●	●			
Thread measurements		●						●			●	●	●		●		●
Gear Measurements			●					●			●	●	●		●		●
Geometrical error measurements				●				●			●	●	●		●		●
Roundness measurements					●				●			●	●			●	
Roughness measurements					●					●	●	●	●			●	
Machine acceptance tests	●	●	●		●		●	●									
new trend in measurement techniques						●								●	●	●	

Learning Method / ILO Matrix

Learning Method	a1	a2	a3	a4	a5	a6	b1	b2	b3	b4	c1	c2	c3	d1	d2	d3	d4
Class Lectures	●	●	●	●	●		●	●	●	●							
Laboratory							●	●	●	●	●	●	●				
Internet search						●								●	●	●	●

Assessment Methods / ILO Matrix

Assessment	a1	a2	a3	a4	a5	a6	b1	b2	b3	b4	c1	c2	c3	d1	d2	d3	d4
Written report	●	●	●	●	●	●		●	●					●	●		●
Assignment	●	●		●	●		●		●	●							
Quiz	●	●	●	●	●	●	●	●	●	●							
Mid term exam	●	●	●				●	●									
Oral Examination											●	●	●				
Final Examination	●	●	●	●	●	●	●	●	●	●							

Course specifications of

Systems Modelling – MDP 443

University: Ain Shams **Faculty: Engineering**

Program on which the course is given:	**B. Sc. in Mechanical Engineering.**
Major or minor element of program :	N.A.
Department offering the program :	Design and Production Engineering.
Department offering the course:	Design and Production Engineering
Academic year/ Level:	4^{th} , First semester
Date of specification approval:	

A- Basic Information

Title:	**Systems Modelling**	**Code:**	MDP 443
Credit Hours:	**N.A.**	**Lecture:**	2
Tutorial :	2	**Practical:**	0
Total:	4		

B- Professional Information

1- Overall aims of course

By the end of this course, the student will be able to:

1- Identify the problem
2- Construct a model of the given problem.
3- Test the model to ensure that its behavior conforms to the behavior of the actual problem under real situation.
4- Identify and collect data (supply values for input parameters).
5- Run the simulation process.
6- Make a plan of experimental tests.
7- Analyze results.
8- Use simulation packages.

The student shall attain the above mentioned objectives efficiently under controlled guidance and supervision while gaining the experience through application and analysis of realistic case studies.

2- Intended learning outcomes of course (ILOs)

a. Knowledge and understanding

a1- Define a problem.

a2- Define decision alternatives.

a3- Describe restrictions on decisions to be made.

a4- Define objective criterion for evaluating the alternatives.

a5- Explain the effect of model accuracy in representing the real system on the quality of the resulting solution.

a6- Know the meaning of optimization.

a7- Know the close relation between Queuing theory and Simulation.

b. Intellectual skills

b1- Assess the formulation of a real problem into a simulation model.

b2- Use Statistical distributions to represent input data.

b3- Use appropriate techniques for the verification and validation of the simulation model.

b4- Use statistical tools in the analysis of simulation results.

b5- Make manual simulation using Monte Carlo technique.

c. Professional and practical skills

c1- Identify data and structure of realistic problems.

c2- Construct the appropriate simulation model to deal with real case studies.

c3- Adapt the real data to suit the simulation model or vice versa.

C4-Deal with simulation packages.

d. General and transferable skills

d1- Search for real objectives and constraints.

d2-Write technical reports and conduct presentation about a real case study.

d2-Practice working in a team.

3- Contents

No	Course Content	Lecture	Tutorial	Total

1	Overview and definitions	2	2	0
2	Queuing Models as the basis of simulation	6	2	4
3	Monte Carlo Simulation	4	2	2
4	Input data analysis using statistical distributions	12	4	8
5	Simulation Package (SLAM or ARENA)	18	10	8
6	Methods of Model validation and verification	6	4	2
7	Design of experiments	8	4	4
8	Case studies	4	2	2
	Total	60	30	30

4- Assessment schedule

Assessment method	No	Description	Week No	Weight (%)
Assessment	1	Assessment No. 1	2	1
Assessment	2	Assessment No. 2	4	1
Written exam	3	Quiz No. 1	5	3
Written exam	4	Mid term Examination	7	10
Assessment	5	Assessment No. 3	9	1
Written exam	6	Quiz No. 2	10	4.5
Case study	7	Case study No. 1	11	7.5
Assessment	8	Assessment No. 4	12	2
Written Exam	9	Final Term Examination	16	70
Total				100 %

5- List of reference

5.1 Course notes……………………………………………………………………………………

5.2- Essential books (text books)

Course Coordinator: Dr. Mohamed Fouad Abdin

Head of Department: Prof. Dr. Hesham abd el hameed sonbol

Date: / /

1- Averill, L. and Kelton, D.M.; Simulation Modelling and Analysis; McGraw Hill Co.; 1999.
2- Kelton, D.M., Sadowski, R.P. and Sadowski, D.A.; Simulation with Arena with CD Rom; McGraw Hill; 2001.

5.3- Recommended books……………………………………………………………………………

5.4- Periodicals, Web sites, … etc

1- www.ie.org

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6- Facilities required for teaching and learning

1- Appropriate teaching class accommodations including presentation board and data show.
2- Computer Lab for software use.

Course Coordinator: Dr. Mohamed Fouad Abdin

Head of Department: Prof. Dr. Hesham abd el hameed sonbol

Date: / /

Course specifications of

Tool Design - MDP 451

University: Ain Shams **Faculty: Engineering**

Programme on which the course is given	B. Sc.. in Design and production department .
Major or minor element of programme	N.A.
Department offering the programme	Design and production department
Department offering the course :	Design and production department Fifth
Academic year/ Level :	year/Second semester
Date of specification approval :	

A- Basic Information

Title :	Tool Design	**code :**	MDP-451		
Credit Hours :	N.A.	**Lecture :**	3		
Tutorial :	3	**Practical**	0	**Total:**	6

B- Professional Information

1 – Overall aims of course

By the end of the course the students will be able to:

- Demonstrate knowledge and understanding of jigs, fixtures, cutting tool design and injection molding.
- Represent the different techniques of tool designs.
- Recognize and calculate the different types of clamping and cutting forces during machining.
- Formulate the stresses and deflection due to the clamping and cutting forces.
- Solve by using a block diagrams the design problems of clamping and cutting forces.
- construct the jig, fixture, cutting tool and injection molding

2- Intended learning outcomes of course (ILOs)

a-Knowledge and understanding

a1 - Explain advantages of jigs and fixtures.
a2 - Identify principal of locations.
a3 - Explain types of locators.
a4 - Define over determined locations.
a5 - Describe principal of clamping.
a6 - Explain types of clamping and clamping force.
a7 - Define Drilling jigs and indexing jigs.
a8 - Define Milling fixtures and indexing table.
a9 - Identify single and multiple piece fixtures.
a10 - Explain turning, welding and assembly fixtures.

a11 - Explain Manufacturing of jigs and fixture.
a12 - Identify Economy of jigs and fixture.
a13 - Describe Modern cutting tool materials.
a14 - Describe manufacturing of turning form tools.
a15 - Define Drilling tools.
a16 - Define Form relieved milling cutters.
a17 - Identify Broaching tools.
a18 - Describe Gear cutting tools.
a19 - Identify Threading tools.
a20 - Describe High speed machining tools.
a21 - Explain Types of injection molds for thermoplastics.
a22 - Define Number of cavities and layout.
a23 - Identify Feeding, cooling, and ejection system.
a24 - Explain Manufacturing of injection molds.

b-Intellectual skills

b1 - Recognize how to construct the jigs and fixtures.
b2 - check the stresses and deflections on the cutting tool.
b3 - construct the detail drawing of injection molding.

c-Professional and practical skills

c1 - Problem definition and mathematical simulations of jigs, fixtures, cutting tool, and injection molding.
c2 - Deal with professional computer programs used for tool design.
c3 - Select the force, deflection and stress analysis of the different tools.

d-General and transferable skills

d1 - Present and analysis the given problems in groups.
d2 - Write technical reports and conduct presentation about tool design.
d3 - practice drawing of the given problem.

Course Coordinator: Prof. Dr. Mohamed Abdel Mohsen
Head of Department: Prof.Dr. Hesham Senbel
Date: / /

3- Contents

No	Course Content	Class Lectures	Tutorials/Software application	Total
1	Advantages of jigs and fixtures	6	6	12
2	Principal of locationsAnd types of locators	6	6	12
3	Principal of clamping	6	6	12
4	Drilling jigs and indexing jigs	5	6	11
5	Modern cutting tool materials	4		4
6	Drilling and milling tools	6	6	12
7	Broaching tools. Gear cutting tools	6	6	12
8	Types of injection molds	2	3	5
9	Feeding system, Cooling system & Ejection system	4	6	10
	Total Hours	45	45	90

Course Coordinator: Prof. Dr. Mohamed Abdel Mohsen
Head of Department: Prof.Dr. Hesham Senbel
Date: / /

4- Assessment schedule

Assessment method	No	Description	Week No	Weight (%)
Assignment		Assignment 1	Week 3	1
Assignment		Assignment 2	Week 5	1
Written exams		Mid term exam	Week 7	15
Assignment		Assignment 3	Week 9	1
Assignment		Quiz	Week 10	5
Report		Report	Week 11	5
Assignment		Assignment 4	Week 12	2

Course Coordinator: Prof. Dr. Mohamed Abdel Mohsen
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Date: / /

Written exams		Final exam	Week 16	70
Total				100 %

5- List of references

5. 1 Course notes

- Lecture Notes

5. 2 Essential books (text books)

- Course Notes

6- Facilities required for teaching and learning

- Appropriate teaching class accommodations including presentation board and data show

Course Content/ILO Matrix

Course Content	a1	a10	a11	a12	a13	a14	a15	a16	a17	a18	a19	a2	a20	a21	a22	a23	a24	a3	a4	a5	a6	a7	a8	a9	b1	b2	b3	c1	c2	c3	d1	d2	d3
Advantages of jigs and fixtures	●		●	●																				●	●								
Principal of locationsAnd types of locators		●										●						●	●														
Principal of clamping																				●	●					●							
Drilling jigs and indexing jigs							●															●	●										
Modern cutting tool materials					●	●																								●			
Drilling and milling tools								●			●		●																●			●	
Broaching tools.Gear cutting tools									●	●																							
Types of injection molds														●	●																		
Feeding system, Cooling system & Ejection system																●	●										●	●			●		●

Course Coordinator: Prof. Dr. Mohamed Abdel Mohsen

Head of Department: Prof.Dr. Hesham Senbel

Date: / /

Learning Method /ILO Matrix

earning Meth	a1	a10	a11	a12	a13	a14	a15	a16	a17	a18	a19	a2	a20	a21	a22	a23	a24	a3	a4	a5	a6	a7	a8	a9	b1	b2	b3	c1	c2	c3	d1	d2	d3
Class Lectures	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●				
Tutorials/Software application	●	●	●	●			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●

Course Coordinator: Prof. Dr. Mohamed Abdel Mohsen

Head of Department: Prof.Dr. Hesham Senbel

Date: / /

Assessment Methods /ILO Matrix

Assessment	a1	a10	a11	a12	a13	a14	a15	a16	a17	a18	a19	a2	a20	a21	a22	a23	a24	a3	a4	a5	a6	a7	a8	a9	b1	b2	b3	c1	c3	d1	d2	d3
Assignments and Quiz to assess ability to solve problems and analyze results independently : Assignment 1	●											●						●	●	●												
Assignments and Quiz to assess ability to solve problems and analyze results independently : Assignment 2																				●	●	●	●									
Written exams (mid-term & final) to assess understanding and scientific knowledge : Mid term exam																												●	●			●
Assignments and Quiz to assess ability to solve problems and analyze results independently : Assignment 3		●	●	●																				●								
Assignments and Quiz to assess ability to solve problems and analyze results independently : Quiz																									●		●					

Course Coordinator: Prof. Dr. Mohamed Abdel Mohsen

Head of Department: Prof.Dr. Hesham Senbel

Date: / /

Assessment Methods /ILO Matrix

Assessment	a1	a10	a11	a12	a13	a14	a15	a16	a17	a18	a19	a2	a20	a21	a22	a23	a24	a3	a4	a5	a6	a7	a8	a9	b1	b2	b3	c1	c3	d1	d2	d3
Report to assess practical, and presentation skills : Report														●	●	●	●													●	●	●
Assignments and Quiz to assess ability to solve problems and analyze results independently : Assignment 4					●	●	●	●	●	●	●		●																			
Written exams (mid-term & final) to assess understanding and scientific knowledge : Final exam	●			●												●				●						●	●	●	●			●

Course Coordinator: Prof. Dr. Mohamed Abdel Mohsen

Head of Department: Prof.Dr. Hesham Senbel

Date: / /

Course specifications of

Operations Research - MDP 455

University: Ain Shams **Faculty: Engineering**

Program on which the course is given	B. Sc. in Mechanical Engineering.
Major or minor element of program	N.A.
Department offering the program	Design and Production Engineering
Department offering the course	Design and Production Engineering
Academic year/ Level:	Fifth year/First semester
Date of specification approval:	/ /

A- Basic Information

Title :	Operations Research	**code :**	MDP-455	
Credit Hours	N.A.	**Lecture :**	2	
Tutorial :	2	**Practical**		**Total** 4

B- Professional Information

1 – Overall aims of course

By the end of the course the students will be able to:

- Define the problem.
- Construct a suitable model.
- Solve the model.
- Validate the model.
- Implement the solution.
- Use available Operations Research software.
- Adapt real data to suit available OR techniques.
- The student shall attain the above mentioned objectivies efficiently under controlled guidance and supervision while gaining the experience through application and analysis of realistic case studies.

2- Intended learning outcomes of course (ILOs)

a- Knowledge and understanding

a1- Define a problem.
a2- Define decision alternatives.
a3- Describe restrictions on decisions to be made.
a4- Define objective criterion for evaluating the alternatives.
a5- explain the effect of model accuracy in representing the real system on the quality of the resulting solution.
a6- Identify the meaning of optimization.

Course Coordinator:	Prof.Dr.Mohamed Fouad Abdeen
Head of Department:	Prof.Dr. Hesham Senbel
Date: / /	

b- Intellectual skills:

- b1 - Assess the formulation of a real problem into a mathematical model.
- b2 - Use the graphical and simplex methods to solve linear programming problems.
- b3 - Deal with various types of constraints and variables in linear programming problems.
- b4 - Use of transportation and assignment algorithms.
- b5 - Use of network techniques and specially: Maximum flow, shortest routes and minimum spanning trees.
- b6 - Analyze single channel and multiple channels queuing mode

c- Professional and practical skills

- c1 - Identify the structure of realistic problems.
- c2 - Select the appropriate OR model to deal with real case studies.
- c3 - Adapt the real data to suit the OR model or vice versa.
- c4 - Deal with computer programs for operations research.

d- General and transferable skills

- d1 - Search for real objective functions and constraints.
- d2 - Write technical reports and conduct presentation about a real case study.
- d3 - Practice working in a team.

3- Contents

No	Course Content	Class Lectures	Software app	Total
1	Overview and Definitions	2		2
2	Introduction to linear programming: Problem formulation	2	4	6
3	Solution of LP using graphical method	2	2	4
4	The simplex method	4	8	12
5	The Transportation problem	4	4	8
6	The assignment Problem	4	2	6
7	The Maximum flow problem	4	4	8
8	The shortest route problem	2	2	4
9	The minimum spanning tree	2	2	4
10	Queuing models	4	2	6
	Total Hours	30	30	60

Course Coordinator: Prof.Dr.Mohamed Fouad Abdeen

Head of Department: Prof.Dr. Hesham Senbel

Date: / /

4- Assessment schedule

Assessment method	No	Description	Week No	Weight
Assignment	1	Assignment 1	Week 2	2
Assignment	2	Assignment 2	Week 4	2
Quiz	1	Quiz 1	Week 5	3
Mid Term Exam		Writen Exam 1	Week 7	10
Assignment	3	Assignment 3	Week 9	2
Quiz	2	Quiz 2	Week 10	3
Case Study		Report and Presentation	Week 11	6
Assignment	4	Assignment 4	Week 12	2
Fnal Term Exam		Writen Exam 2	Week 16	70
Total				100

5- List of references

5. 1 Course notes

- Course notes

5. 2 Essential books (text books)

- Hamdy A. Taha, Operations Research, Prentice Hall, Seventh Edition, 2006.

5. 3 Recommended books

- William J. Stevenson, Production Operation Management, Mc Graw-Hill companies, Inc., Six Editions, 1999.

5. 4 Periodicals, Web sites, … etc

- www.ie.org

6- Facilities required for teaching and learning

- Appropriate teaching class accommodations including presentation board and data show.
- Computer Lab for software use.

Course Coordinator: Prof.Dr.Mohamed Fouad Abdeen

Head of Department: Prof.Dr. Hesham Senbel

Date: / /

Course Content /ILO Matrix

Course Content	a1	a2	a3	a4	a5	a6	b1	b2	b3	b4	b5	b6	c1	c2	c3	c4	d1	d2	d3
Overview and Definitions	●	●											●	●					
Introduction to linear programming: Problem formulation			●				●		●				●						●
Solution of LP using graphical method			●					●								●			
The simplex method								●	●					●	●				
The Transportation problem				●	●					●							●		
The assignment Problem						●				●									
The Maximum flow problem											●								
The shortest route problem											●					●			
The minimum spanning tree											●							●	
Queuing models												●							

Learning Method /ILO Matrix

Learning Method	a1	a2	a3	a4	a5	a6	b1	b2	b3	b4	b5	b6	c1	c2	c3	c4	d1	d2	d3
Class Lectures	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●				
Tutorials/Software application			●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

Assessment Methods /ILO Matrix

Assessment	a1	a2	a3	a4	a5	a6	b1	b2	b3	b4	b5	b6	c1	c2	c3	c4	d1	d2	d3
Assignment 1	●	●	●																
Assignment 2				●										●	●				
Quiz		●	●							●				●					
Mid-term Exam		●	●				●	●	●										
Assignment 3					●	●													
Quiz											●	●							
Case Study													●			●	●	●	●
Assignment 4							●	●	●										
Final Exam		●						●	●	●	●	●							

Course Coordinator: Prof.Dr.Mohamed Fouad Abdeen

Head of Department: Prof.Dr. Hesham Senbel

Date: / /

Course Specifications of

Numerical Control Machines – MDP 471

BASIC INFORMATION	
Educational institute	Faculty of Engineering/ Ain Shams University
Corresponding program	B.Sc. in Mechanical Engineering / Ain Shams University
Academic level	4^{th} year Production Engineering
Course title	Numerical control machines
Course code	MDP 471
Course per week hours	5 hours/Week
Lectures	3 hours/Week
Tutorial	2 hours/Week

COURSE OBJECTIVES	
By the end of this course student will be able to:	
1	Construct the machining operation sequence for turning and milling products.
2	Understand different elements of CNC machines, both mechanical and electronic.
3	Understandthe basic CNC programming concepts.
4	Construct a part program, for both turning and milling products.

INTENDED LEARNING OUTCOMES (ILOs)	
a	**Knowledge and understanding**
a1	Know the different types of electronic modules used in modern controllers.
a2	Identify the machine program structure.
a3	List the different machine elements parts.
a4	List the different machine control elements parts.
a5	List and explain different manual programming commands.
a6	Summarizes the programming procedure.
b	**Intellectual skills**
b1	Constructs the part program with appropriate programming commands.
b2	Analyses a program to fetch the syndics and semantics errors.
b3	Creates CNC program for a real case study.
c	**Professional and practical skills**
c1	Use appropriate CNC lab machine equipment.
c2	Perform a real cutting process on CNC machine in lab.
c3	Setup the machine for real cut.
d	**General and transferable skills**
d1	Present the programming methods in oral seminar.

d2	Present the new trend in machine control in oral seminar.
d3	Work as a part of a team in programming project group for real case study.

COURSE PROGRAM

No	Topic	Lecture	Tutorial	Total
1	CNC Machines Main components	3	-	3
2	CNC Machines Control Systems	6	2	8
3	Fundamentals of programming	3	4	7
4	Part program, G and M codes	3	4	7
5	Manual programming for milling products	6	4	10
6	Manual programming for turning products	6	4	10
7	Advanced part programming 1	6	4	10
8	Advanced part programming 2	6	4	10
9	Modern control of CNC machine tools 1	3	2	5
10	Modern control of CNC machine tools 2	3	2	5
TOTAL HOURS		**45**	**30**	**75**

Teaching and learning methods

1	Class lectures
2	Tutorials
3	CNC machine tool Laboratory resources
4	Internet search

Student assessment methods

1	Written exams (midterm/final)
2	Assignments
3	Quizzes
4	Reports

Assessment schedule

No	Description	Week
1	Assignment 1	2
2	Assignment 2	3
3	Report1	4
4	Assignment 3	5
5	Midterm exam	7
6	Assignment 4	9
7	Report2	10

8	Assignment 5	11
9	Assignment 6	12
10	**Final Exam**	15

Assessments weighting

No	Description	Weight
1	Mid-Term exam	20
2	Final-Term exam	90
3	Assignments	10
4	Reports	5
	Total	**125**

List of references

No	Description	Details
1	**Course notes**	
2	**References books**	COMPUTER NUMERICAL CONTROL, Joseph Pusztai& Michael Sava, A Prentice-Hall Company, 1983.
		COMPUTER NUMERICAL CONTROL OF MACHINES TOOLS, G.E.Thyer, Second edition, NEWNES, 1991.
		COMPUTER NUMERICAL CONTROL, Hans B. Kief, T. Frederick Waters, Glencoe, 1992.

TEACHING FACILITIES

Appropriate teaching class hall/ Presentation board/ Data show.
CNC lab equipped with educational programming workstations.

Course Content/ILO Matrix

Course Content	a1	a2	a3	a4	a5	a6	b1	b2	b3	c1	c2	c3	d1	d2	d3
CNC Machines Main Components	●	●	●												
CNC Machine Control Systems				●											
Fundamentals of Programming					●										
Part program, G and M Codes						●									
Manual Programming For Milling M/C							●	●			●	●	●		●
Manual Programming For Turning M/C							●	●			●	●		●	
Advanced Part programming, Cycles, Macros									●						
Automatic Programming, APT language							●								
Modern control of *CNC machine tools, Adaptive control, PLC										●			●	●	

Learning Method /ILO Matrix

Learning Method	a1	a2	a3	a4	a5	a6	b1	b2	b3	c1	c2	c3	d1	d2	d3
Class Lectures	●	●	●	●	●	●	●	●	●	●	●	●	●		
Tutorials/Software application						●	●	●	●	●	●	●	●	●	●

Assessment Methods /ILO Matrix

Assessment	a1	a2	a3	a4	a5	a6	b1	b2	b3	c1	c2	c3	d1	d2	d3
Assignment (1)	●	●	●												
Report (1)	●	●	●	●			●								
Midt erm exam					●	●	●	●	●						
Assignment (2)					●		●								
Quiz	●	●	●	●	●	●			●						
Report (2)										●	●	●	●	●	●
Assignment (3)														●	
oral seminar										●	●	●	●	●	●
Final Exam	●	●	●	●	●	●	●	●	●						

Course Specifications of

Project – MDP 499

University: Ain Shams University **Faculty: Engineering**

Programme on which the course is given	Production BSc.
Major or minor element of programme	N.A.
Department offering the programme	Production Dept.
Department offering the course	Design and Production Engineering Dept.
Academic year/ Level	5^{th} year / 1^{st} and 2^{nd} Semester
Date of specification approval	/ /

A- Basic Information

Title:	Project	**Code:**	MDP-499		
Credit Hours:	N.A.	**Lecture:**	0		
Tutorial:	2	**Practical:**	2	**Total:**	4

B- Professional Information

1- Overall Aims of the Course

This course aims to:

- Teach students how to analyze and design a complete engineering system in a selected topic using the fundamental principles and skills he gained during his study, and representing his experience in a report by the end of the project.

2- Intended Learning Outcomes of the course (ILOs)

By completing this course successfully, the student will be able to:

a- Knowledge and Understanding

a1. Explain the principles, fundamentals, and mathematical models for certain engineering problems.
a2. Identify the definitions of the design projects problems.
a3. Infer with industry and various engineering end user market to recognize practical engineering problems.

b- Intellectual Skills

b1. Solve real case problems.
b2. Design experimental or computer simulation model for practical engineering problems
b3. Evaluate alternative design solutions.
b4. Write an experimental design plan to investigate the problem variable effects.

c- Professional and Practical Skills

c1. Analyze realistic mechanical problems with practical system data.
c2. Interface with industry and various engineering end user market to recognize practical engineering problems.

c3. Troubleshoot the practical encountered problems during the project implementations.
c4. Use the appropriate lab equipment when testing the performance of the project.

d- General and Transferable Skills

d1. Emphasize the team work by practicing developing real life project samples in a group.
d2. Practice oral presentation and interviews to defend the project design report.
d3. Raise the awareness of professional ethics.

3- Contents

Total	Software	Oral discussion	Lecture Note	Field Study	Course Content	No
10	-	-	5	5	Choosing the title of a complete engineering project belongs to one of the main sub-topics of the design and production engineering department.	**1**
30	-	20	-	10	Design how to implement the required project so that it satisfies the concerned industrial code requirement.	**2**
40	20	-	20	-	Doing appropriate analysis to get the optimum specifications for all the required project's elements	**3**
10	-	-	-	10	Buy the project elements and start to construct it.	**4**
10	-	-	-	10	Complete the construction of the project	**5**
32	17	-	-	15	Doing the theoretical and experimental analysis required to judge the performance of the project	**6**
40	28	-	12	-	Writing the final project report, showing all of its details.	**7**
60	20	28	12	-	Preparing the project presentation	**8**
232	**85**	**48**	**49**	**50**	**Total :**	

4- Assessment Schedule

Weight (%)	Week No.	Description	No.	Assessment Method
5 %	Week 3	Visiting, Progress and Status Report (1)	**1**	Report
2 %	Week 4	Monthly Oral Discussion (1)	**2**	Oral Discussion
3 %	Week 7	Progress and Status Report (2)	**3**	Report
2%	Week 8	Monthly Oral Discussion (2)	**4**	Oral Discussion
5 %	Week 11	Visiting, Progress and Status Report (3)	**5**	Report
2 %	Week 12	Monthly Oral Discussion (3)	**6**	Oral Discussion
8 %	Week 14	Mid-year Exam	**7**	Oral Exam
3 %	Week 18	Status and Progress Report (4)	**8**	Report
2 %	Week 20	Monthly Oral Discussion (4)	**9**	Oral Discussion
3 %	Week 23	Progress and Status Report (5)	**10**	Report
2 %	Week 24	Monthly Oral Discussion (5)	**11**	Oral Discussion
3 %	Week 27	Progress and Status Report (6)	**12**	Report
2 %	Week 28	Monthly Oral Discussion (6)	**13**	Oral Discussion
3 %	Week 30	Visiting and Status Report (7)	**14**	Report
2 %	Week 31	Monthly Oral Discussion (7)	**15**	Oral Discussion
3 %	Week 32	Monthly Oral Discussion (8)	**16**	Oral Discussion
50 %	Week 34	Final Exam	**17**	Oral Exam
100 %				**Total :**

5- List of references

5.1 Course Notes

- None

5.2 Essential Books (Text Books)

- Selected text Books in the field of the project, scientific papers, research reports, manuals, catalogues, and software packages.

5.3 Recommended Books

- None

5.4 Periodicals, Websites… etc

- None

6- Facilities Required for teaching and Learning

- Appropriate teaching class accommodations including presentation board and data show.
- Automotive Engineering Lab.
- Computer Software Lab.
- Field Visits.

Course Content/ILO Matrix

d3	d2	d1	c4	c3	c2	c1	b4	b3	b2	b1	a3	a2	a1	Course Content
											●		●	Topic no.(1)
						●				●		●		Topic no.(2)
					●				●					Topic no.(3)
			●					●						Topic no.(4)
●			●	●	●									Topic no.(5)
			●	●	●		●							Topic no.(6)
●	●	●												Topic no.(7)
●	●	●												Topic no.(8)

Learning Method/ILO Matrix

d3	d2	d1	c4	c3	c2	c1	b4	b3	b2	b1	a3	a2	a1	Learning Method
●	●	●			●				●		●		●	Lecture Note
●			●	●	●	●	●	●		●	●	●	●	Field Study
●	●	●	●	●	●		●		●					Software
●	●	●				●				●		●		Oral Discussion

Assessment Methods/ILO Matrix

d3	d2	d1	c4	c3	c2	c1	b4	b3	b2	b1	a3	a2	a1	Assess. Method
				●	●	●		●	●	●	●		●	Reports
●		●		●	●				●	●		●		Oral Discussion
											●	●	●	Mid-year Exam
●	●	●	●	●			●		●	●			●	Final Exam

AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING
DESIGN AND PRODUCTION
ENGINEERING DEPARTMENT

جامعة عين شمس
كلية الهندسة
قسم التصميم وهندسة الإنتاج

2012/5/13

السيد الاستاذ الدكتور / مدير وحدة الجودة

تحية طيبة وبعد ...

رجــاء الــتكرم بالاحاطــة بان مجلس القسم بتاريخ 2012/4/28 قد وافق على الطلب المقدم من د. محمد احمد عوض المنسق للجودة بالقسم بشأن حذف المواد من برنامج بكالوريوس انتاج ضمن مجموعة المواد الاختيارية "3" حيث أنها لم تطرح نهائيا منذ ادراجها فى اللائحة وعدد هذه المواد مادتين .

وتفضلوا بقبول وافر التحية ،،،،

رئيس مجلس القسم

٢٠١٢/٥/١٥

أ.د. هشام على عبد الحميد سنبل

١ شارع السرايات – عبده باشا العباسية – ١١٥١٧ القاهرة ت: ٦٨٢٦٦٣٦ – ٦٨٣٤٤٤٥ فاكس : ٦٨٥٠٦١٧
1, El-Sarayat St., Abdou Pasha, Abassia, Cairo Tel.: 682 66 36 _ 683 44 45 Fax: 685 06 17

السيد الاستاذ الدكتور رئيس مجلس القسم

تحية طيبه وبعد

برجاء التكرم باتخاذ اللازم نحو حذف المواد التالية من برنامج بكالوريوس انتاج ضمن مجموعة المواد الاختيارية (3) حيث أنها لم تطرح نهائيا منذ ادراجها فى اللائحة وعدد هذه المواد مادتين بيانها كالتالى

Course Code	Course Name	اسم المادة
CEP 452	Environmental Engineering	هندسة بيئية
CSE 461	Information Systems	نظم معلومات

منسق الجودة بالقسم

د. محمد أحمد عوض

AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING
DESIGN AND PRODUCTION
ENGINEERING DEPARTMENT

جامعة عين شمس
كلية الهندسة
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CSE 461	Information Systems	نظم معلومات

منسق الجودة بالقسم

د. محمد أحمد عوض

Course specifications of

Project Management – HUM x32 2016/2017

University: Ain Shams **Faculty: Engineering**

Programme on which the course is given: **Mechanical Engineering**
Major or minor element of programme : Design and Production Engineering
Department offering the programme : Mechanical Engineering
Department offering the course: Design and Production Engineering
Academic year/ Level: 4th year, 2017 Spring Semester
Date of specification approval: / /2017

A- Basic Information

Title:	Project Management	**Code:**	HUM x32
Credit Hours:	**N.A.**	**Lecture:**	2
Tutorial :	2	**Practical:**	0
Total:	4		

B- Professional Information

1- Overall aims of course

This course aims at providing students with the basics, theory, and applications of project management techniques to project activities.

2- Intended learning outcomes of course (ILOs)

a. Knowledge and understanding

a1- Defines the key decisions in project management
a2- Defines the basics of Work Breakdown Structure (WBS)
a3- Describes the basics of a Gantt chart
a4- Identifies the Critical Path Method (CPM)
a5- Identifies the Program Evaluation and Review Technique (PERT)
a6- Describes the project cost management techniques

b. Intellectual skills

b1- Applies project management fundamentals to project problems
b2- Applies different crashing techniques
b3- Applies resources levelling and allocation heuristics

c. Professional and practical skills

c1- Recognizes project activities using Gantt charts
c2- Organizes project management activities using CPM
c3- Combines PERT fundamentals to programs within a project
c4- States relating cost elements.

Course Coordinator:

Head of Department: Prof. Dr. Hesham Senbel

Date: / /

General and transferable skills

d1- Applying project management techniques to real life projects

3- Contents

No	Course Content	Lecture (hrs)	Tutorial (hrs)	Total (hrs)
1	Introduction (new terminologies and definitions)	4	2	6
2	Work break down structure (WBS) and responsibility assignment matrix (RAM).	2	2	4
3	Time estimate techniques	2	2	4
4	Project networks (AON, AOA)	5	5	10
5	Critical path method, CPM (completion time, critical path, and critical activities)	4	7	11
6	Program evaluation review technique, PERT (three time estimate activities)	3	3	6
7	Crashing (either crash to certain time, to the minimum allowed time, or to the minimum cost)	4	5	9
8	Resource scheduling (resource levelling and resource allocation)	4	2	6
9	Project control (Gantt chart and S-Curve)	2	2	4
	Total	30	30	60

4- Assessment schedule

Assessment method	Description	Week No	Weight (%)
Tutorials and seminars	Assess problem solving skills and presentations	from week 3	5
Project	Term project	All	10
Written exams	Asses student progress, Assess problem solving and intellectual skills	9 &12	10
Absence		All	5
Final term examination	Assess knowledge of basic theory and problem solving and intellectual skills	15	70
Total			100 %

Course Coordinator:

Head of Department: Prof. Dr. Hesham Senbel

Date: / /

5- List of references

a. Course notes

-Developed by course instructors.

b. Recommended books

- The Project Management Institute (2013), A Guide to the Project Management Body of Knowledge (PMBOK® Guide), Fifth Edition.
- Effective project management, Wysocki, R. K., 2014, Wiley.
- Kerzner, H., “Project Management: A Systems Approach to Planning, Scheduling, and Controlling”, 2009, 10th edition, John Wiley & Sons.
- Project planning scheduling and control, J. P. Lewis, Irwin.
- Operations management, W.J. Stevenson, 11th ed, 2012, McGraw-Hill.

6- Facilities required for teaching and learning

- Whiteboard and data-show in lectures; whiteboard in tutorials

Course Content/ILO Matrix

Course Content	a1	a2	a3	a4	a5	a6	b1	b2	b3	c1	c2	c3	c4	d1
Introduction (new terminologies and definitions)	●		●				●							
Work break down structure (WBS) and responsibility assignment matrix (RAM).		●					●							●
Time estimate techniques	●													
Project networks (AON, AOA)				●							●			
Critical path method, CPM (completion time, critical path, and critical activities)				●			●				●			●
Program evaluation review technique, PERT (three time estimate activities)					●		●					●		●
Crashing (either crash to certain time, to the minimum allowed time, or to the minimum cost)								●		●				

Course Coordinator:

Head of Department: Prof. Dr. Hesham Senbel

Date: / /

Resource scheduling (resource levelling and resource allocation)									●	●				
Project control (Gantt chart and S-Curve)			●							●			●	

Learning Method /ILO Matrix

Learning method	a1	a2	a3	a4	a5	a6	b1	b2	b3	c1	c2	c3	c4	d1
Lecture	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Tutorial							●	●	●	●	●	●	●	

Assessment Methods /ILO Matrix

Assessment	a1	a2	a3	a4	a5	a6	b1	b2	b3	c1	c2	c3	c4	d1
Tutorials								●	●	●	●	●	●	●
seminars	●	●	●	●	●	●								
Written exams	●	●	●	●	●	●		●	●	●	●	●		
Project							●	●	●	●	●	●		●
Final examination			●	●	●	●		●	●	●	●	●	●	

Course Coordinator:

Head of Department: Prof. Dr. Hesham Senbel

Date: / /

Course Specifications of

Legalisation and Contracts – Hum x41

University: Ain Shams University **Faculty: Engineering**

Programme on which the course is given	Mechatronics BSc.
Major or minor element of programme	N.A.
Department offering the programme	Mechatronics Dept.
Department offering the course	Computer and Systems Engineering
Academic year/ Level	5^{th} year / 2^{nd} Semester
Date of specification approval	/ /

A- Basic Information

Title:	Legilisation & Contracts	**Code:**	HUM-x41
Credit Hours:	N.A.	**Lecture:**	2
Tutorial:	1	**Practical:**	0 **Total:** 3

B- Professional Information

1- Overall Aims of the Course

This course aims to:

- Teach students how to deal with local and international contracts.
- Train students to get acquainted with the laws and Legilisation concerning engineering works of related fields.
- Train students on how to settle claims and disputes.

2- Intended Learning Outcomes of the course (ILOs)

By completing this course successfully, the student will be able to:

a- Knowledge and Understanding

a1. Define legal orientation to clarify responsibilities and rights within the triangle relation between: engineer, client and contractor.

a2. Identify the relevant laws and regulations governing the engineering works in all fields.

a3. Outline the conditions of all types of contracts including contracts for design, build and turnkey projects.

a4. Identify the different steps in preparing an arbitration file and pre-arbitral procedures.

a5. Define the role of engineer in all legal activities as well as contracts, claims and disputes during execution.

b- Intellectual Skills

b1. Demonstrate legal orientations,

b2. Analyze legal actions and problems.

b3. Conclude solutions.

b4. Criticize Actions

c- Professional and Practical Skills

c1. Formulate an Evaluation of contract document.

c2. Appraise legal reports, contracts, and arbitration file in accordance with the local and international laws and regulations.

d- General and Transferable Skills

d1. Manage all work as a part of a team in legal assignments.

3- Contents

No	Course Content	Lecture	Tutorial	Total
1	Introduction to the study of law, Appropriate definitions, Demonstration of relevant laws and regulations governing the engineering works in all fields. Engineer Liabilities and Rights.	8	4	12
2	Local and International (e.g. FIDIC) contracts in civil and administrative laws. Writing a contract. Contract coming into force.	8	4	12
3	Claims and disputes resulting thereof during execution of the work. The engineer role in this respect.	6	3	9
4	Settlement of disputes in local and international contracts amicably or by Adhoc or institutional arbitration. Applied Example.	8	4	12
	Total :	**30**	**15**	**45**

4- Assessment Schedule

Assessment Method	No.	Description	Week No.	Weight (%)
Assignment	**1**	Example of Engineers Liabilities	Week 4	10 %
Written Exam	**2**	Midterm Exam	Week 6	13 %
Assignment	**3**	Settlement of specific dispute	Week 10	10 %
Written Exam	**4**	Final Exam	Week 14	67 %
			Total :	100 %

5- List of references

5.1 Course Notes

– None

5.2 Essential Books (Text Books)

– None

Course Coordinator: Dr. Mohamed El-Hayatmy
Head of Department: Prof. Magdy Abdel-Hameed
Date: / /

5.3 Recommended Books

- Gharaf, A., Principles of Business law, Cairo, 1995.
- Hochuli, U., Role of the Engineer under FIDIC standard contracts,
  International Business Lawyer, December 1991
- أحمد شرف الدين، أصول الصياغة القانونية للعقود، القاهرة, 1992
- أحمد شرف الدين، تسوية منازعات عقود الإنشاء الدولية (نماذج عقود الفيديك) 1997

5.4 Periodicals, Websites… etc

- None

6- Facilities Required for teaching and Learning

- Teaching Aids (overhead projector, Data show)

Course Content/ILO Matrix

Course Content	a1	a2	a3	a4	a5	b1	b2	b3	b4	c1	c2	d1
Introduction to the study of law, Appropriate definitions, Demonstration of relevant laws and regulations governing the engineering works in all fields. Engineer Liabilities and Rights	•	•				•				•		•
Local and International (e.g. FIDIC) contracts in civil and administrative laws. Writing a contract. Contract coming into force.	•		•			•	•			•		•
Claims and disputes resulting thereof during execution of the work. The engineer role in this respect.	•			•		•		•		•	•	•
Settlement of disputes in local and international contracts amicably or by Adhoc or institutional arbitration. Applied Example.					•	•			•	•	•	•

Course Coordinator: Dr. Mohamed El-Hayatmy
Head of Department: Prof. Magdy Abdel-Hameed
Date: / /

Learning Method/ILO Matrix

Learning Method	a1	a2	a3	a4	a5	b1	b2	b3	b4	c1	c2	d1
Lectures	●	●	●	●	●	●	●	●	●	●	●	●
Tutorials	●	●	●	●	●	●	●	●	●			

Assessment Methods/ILO Matrix

Assessment Method	a1	a2	a3	a4	a5	b1	b2	b3	b4	c1	c2	d1
Assignments	●			●						●	●	●
Midterm Exam	●	●	●			●	●			●		
Final Exam	●	●	●	●	●	●	●	●	●			

Course Coordinator: Dr. Mohamed El-Hayatmy
Head of Department: Prof. Magdy Abdel-Hameed
Date: / /

Course Specification for environmental impact assessment

HUMx 42

University: Ain Shams **Faculty**: Engineering

Program on which the course is given design and production

Major or minor element of program N/A

Department offering the program design and production

Department offering the course: design and production

Academic year/ Level: 4 productions

Date of specification approval:

A- Basic Information

Title: environmental impact assessment CODE**:** HUMx42

Lecture: 2

Tutorial: 1

Total 3

B- Professional Information

1- Overall aims of course

By the end of the course the students will be able to:

Demonstrate a clear understanding of physical element affect environment

Evaluate the projects effects on environment and find the significant effect

Select the best mitigation measure to overcome this effect

Evaluate the effect of mitigation measure on the project

Demonstrate the role of engineer to understand environmental problems

Demonstrate the effect of the current environmental problem on earth

Understand in depth what in depth green technology elements

Understand the problem facing the earth regarding environment

2- Intended learning outcomes of course (ILOs)

a- Knowledge and understanding

A1- Explain the different physical element on environment

A2- Identify the major environmental problem for any project

A3- state the Maine key element of the environment impact assessment

A4- state the requirements for a good environmental impact assessment

A5- Identify the significant effect of any project on environment

b- Intellectual Skills

B1- Assign exact procedure for environmental impact assessment for a project

B2- suggest the best mitigation for a project

B3- suggest monitoring plane for a project

B4 Assess the history of environmental problems

B5- Assess the Maine element for the mitigation cost

c- Professional and practical skills

C1-**Identify**the Maine physical element affect environment
C2-**use safely** precaution during the site study
C3- Analyze the significant impact and its mitigations
C4- Deal with the public for explaining the project
C5- Analyze the total outcome of the study

d- General And Transferable skills

D1- Present the technical and presentation skills
D2- Present the oral explanation of the study
D3- Work as a part of a team

Contents

Course Content	Class Lecture	Tutorials	Total
Environmental Assessment basis	2	1	3
Overview and Maine items	2	1	3
EIA around the world	2	1	3
The EIA seven keys area	2	1	3
The EIA seven keys area continues	2	1	3
Basie line study	2	1	3
Example for noise	2	1	3
Example for air quality	2	1	3
Assessment of Environment Background and process	2	1	3
An Example of EIA	4	2	6
Strategic environmental assessment	2	1	3
Green technology [1]	2	1	3
Green technology [2]	2	1	3
S.W.A.T analysis	2	1	3
Total hours	30	15	45

Assessment Schedule

Assessment method	No	Description	Week No	Weight (%)
Assignments	1	Assess practical skills and attitudes	3,9	10
Quiz	2	Assess knowledge of course material	4 ,10	5
Report	3	Assess knowledge of course material	6, 12	10
Midterm Examination	4	Assess knowledge of course material	8	25
Practical oral		Assess knowledge of course material	9,10,11	10
Final term examination	5	Assess problem solving and intellectual skills	15	40
Total				100 %

5- List of Reference
5.1 Course notes

*https://www.cbd.int/impact/whatis.shtml***Environmental Impact Assessment** (EIA)
*http://www.gdrc.org/uem/eia/define.html***Environmental Impact Assessment**
course notes by Dr Mansour El Bardisi

5.2 Essential books (text books)
Environmental Law 4/1994
Environmental Law 9/2009

6- Facilities required for teaching and learning

-Appropriate teaching class room including data show, presentation board and white board

Course content ILO Matrix

Course Content	A1	A2	A3	A4	A 5	B1	B2	B3	B4	B5	C1	C 2	C 3	C 4	C5	D1	D2	D3
Environmental Assessment basis	●																	
Overview and Maine items			●															
EIA around the world				●														
The EIA seven keys area	●	●	●													●		
The EIA seven keys area continues				●	●					●			●					
Basie line study						●					●							
Example for noise							●					●						
Example for air quality												●						
Assessment of Environment Background and process			●		●													
An Example of EIA							●	●		●				●	●		●	●
Strategic environmental assessment								●	●									

Green technology									●									

Learning Method / ILO Matrix

Assessment method	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	C4	C5	D1	D2	D3	D4
Class lecturer	●	●	●	●	●											●	●		
Tutorial						●	●	●	●	●									
Education CD	●	●	●	●	●						●	●	●	●	●				
Internet search															●	●	●	●	●

Assessment Methods /ILO Matrix

Assessment	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	C4	C5	D1	D2	D3	D4
Assignments1	●	●	●			●	●	●											
Written exam :quiz 1											●	●	●						
Written exam : midterm exam	●	●	●			●	●	●											
Report : Report 1																●	●	●	●
Assignments2				●	●				●	●	●	●	●	●	●	●	●	●	
Oral discussion																			
Written exam : final exam	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			

Course Specification

1. Basic Information

<table>
<tr><td>ASU011</td><td colspan="2">Technical English Language</td><td>0 CH</td></tr>
<tr><td>Prerequisites</td><td colspan="3"></td></tr>
<tr><td colspan="4">Number of weekly Contact Hours</td></tr>
<tr><td>Lecture</td><td colspan="2">Tutorial</td><td>Laboratory</td></tr>
<tr><td>2</td><td colspan="2">2</td><td>0</td></tr>
<tr><td>Required SWL</td><td>100</td><td>Equivalent ECTS</td><td>4</td></tr>
<tr><td colspan="4">Course Content</td></tr>
<tr><td colspan="4">Origin of English language, vocabulary from other language including Arabic, main grammar rules, characteristics of technical English, sources of noise in writing, examples from different engineering specialization, punctuation for engineers, how engineering numbers are reported in text, submitting a report on current subject of engineering interest.</td></tr>
<tr><td colspan="4">Used in Program / Level</td></tr>
<tr><td colspan="2">Program Name or requirement</td><td colspan="2">Study Level</td></tr>
<tr><td colspan="2">University Requirement</td><td colspan="2">0</td></tr>
<tr><td colspan="4">Assessment Criteria</td></tr>
<tr><td>Student Activities</td><td>Mid-Term Exam</td><td>Practical Exam</td><td>Final Exam</td></tr>
<tr><td>20%</td><td>20%</td><td>0%</td><td>60%</td></tr>
</table>

2. Course Aims

1. To provide ESP instruction to enhance students' reading and writing in order to provide practice & interest in the language.
2. To prepare students to sit for assessments and evaluations such as tests and quizzes in order to test and revise proper acquisition of the English language.
3. To build students' confidence and motivation through exposure to facts, figures, quotations, and the latest technological innovations so to generate interest in the language from an ESP perspective.
4. To allow students to gain key strategies and expressions for communicating with professionals and non-specialists.

3. Competencies and LO Mapping

A1. Show the importance of writing and speaking correct English.

A2. Prepare reports in good English language

B1. Make classifications of different types of reports.

4. Learning Outcomes (LOs)

Cognitive Domain	
1	Know about the grammar rules and syntax of the English language
2	Interpret the technical concepts of engineering
3	Identify types of sentences
Psychomotor Domain	
4	Communicate effectively in English and design well-structured and convincing texts, in particular technical essays.
Affective Domain	
5	Prepare and present seminars to a professional standard.

Mapping

LOs	Competences		
	A1	**A2**	**B1**
Cognitive Domain			
1	●	●	
2			●
3		●	●
Psychomotor Domain			
4	●	●	●
Affective Domain			
5		●	●

5. Assessment and Feedback Strategy

- Formative Assessment Methods:
  - Pop Quizzes
- Summative Assessment Methods:

- Assignments
- Quizzes
- Practical and Oral Exam
- Mid-Term
- Final Exam.

6. Teaching and Learning Methods

- Lectures and interactive lectures using Microsoft Teams + Uploaded Videos

7. List of References

1. Bingham, Celia (2013) Technical English. Pearson.
2. Murphy, R. (2012) English Grammar in Use. Cambridge.
3. Breiger, N. and Pohl, A. (2002) Technical English: Grammar and Vocabulary. Summertown Publishing.

8. Study Plan

No	Course Content	Lecture (hours)	Tutorials Hours	Total Hours
1	Welcome and Introduction	2	2	4
2	Sentence structure	2	2	4
3	Types of sentences	2	2	4
4	If-conditional	2	2	4
5	Understanding scientific passages	2	2	4
6	Technical terminology	2	2	4
7	Understanding scientific passages	2	2	4
8	Noun clause	2	2	4
9	Understanding scientific passages	2	2	4
10	Adjective clause	2	2	4
11	Active and passive	2	2	4
12	Definite and indefinite articles	2	2	4
13	Writing Practice I	2	2	4
14	Writing Practice II	2	2	4
15	Revision	2	2	4
	Total	30	30	60

9. Assessment schedule

Assessment method	No	Description	Week No	Weight (%)
Written Exam		Mid Term	8	20
Quizzes		Mock exam	-----	-----
Attendance and Participation		Attendance and Participation	1-15	-----
Assignments		Assignments	1-15	20
Written Exam		Final Term Exam	16	60
Total				100 %

4. Course Content / LO Matrix

week	Course Content	LO1	LO2	LO3	LO4	LO5
1	Welcome and Introduction	●				
2	Sentence structure	●				
3	Types of sentences	●	●			
4	If-conditional	●	●			
5	Understanding scientific passages	●	●		●	
6	Technical terminology	●	●			●
7	Understanding scientific passages		●			
8	Noun clause	●			●	●
9	Understanding scientific passages		●			
10	Adjective clause					●
11	Active and passive		●		●	
12	Definite and indefinite articles				●	
13	Writing Practice I				●	●
14	Writing Practice II			●		
15	Revision			●		

5. Assessment Methods / LO Matrix

Assessment	LO1	LO2	LO3	LO4	LO5
Assignments	●		●	●	●
Quizzes	●	●	●	●	
Mid-Term	●	●	●	●	
Final Exam	●	●	●	●	

6. Learning Method / LO Matrix

Learning Method	LO1	LO2	LO3	LO4	LO5
Lecture	●	●	●	●	
Tutorial	●		●	●	●
Self-learning				●	●

Course Specification

1. Basic Information

<table>
<tr><td colspan="3">ASU112</td><td colspan="7">Report Writing and Communication Skills</td><td colspan="2">3 CH</td></tr>
<tr><td colspan="3">Prerequisites</td><td colspan="9"></td></tr>
<tr><td colspan="12">Number of weekly Contact Hours</td></tr>
<tr><td colspan="4">Lecture</td><td colspan="4">Tutorial</td><td colspan="4">Laboratory</td></tr>
<tr><td colspan="4">2</td><td colspan="4">2</td><td colspan="4">0</td></tr>
<tr><td colspan="3">Required SWL</td><td colspan="3">100</td><td colspan="3">Equivalent ECTS</td><td colspan="3">4</td></tr>
<tr><td colspan="12">Course Content</td></tr>
<tr><td colspan="12">Typography and writing, Formal report components, types of engineering reports, content and appearance, communication types, nonverbal communication, memo, letter, email and social media, infographics in reports and presentations, types of graphs, how to evaluation written material and oral presentations.</td></tr>
<tr><td colspan="12">Used in Program / Level</td></tr>
<tr><td colspan="8">Program Name or requirement</td><td colspan="4">Study Level</td></tr>
<tr><td colspan="8">University Requirement</td><td colspan="4">1-4</td></tr>
<tr><td colspan="12">Assessment Criteria</td></tr>
<tr><td colspan="3">Student Activities</td><td colspan="3">Mid-Term Exam</td><td colspan="3">Practical Exam</td><td colspan="3">Final Exam</td></tr>
<tr><td colspan="3">20%</td><td colspan="3">20%</td><td colspan="3">0%</td><td colspan="3">60%</td></tr>
</table>

2. Course Aims

The aim of this course is to provide students with ability to:

- Recognize students to the principles of Technical Writing and Communication Skills
- Develop an understanding of organization of technical report and the articulation of its different components.
- Apply the fundamental principles of technical language aspects in addition to writing styles.
- Explore communication and presentation skills.

3. Intended Learning Outcomes (ILOs)

a.	Knowledge and understanding
a1	Identify the differences between structure and appearance of technical text.
a2	Explain a deeper understanding of graph elements
a3	Identify different types of communication
a4	Describe the importance of social media in communication
b.	Intellectual skills
b1	Apply the technical report style considerations
b2	Design the tables and graphs in technical writing efficitively
b3	Categorize letters, memos and email
c.	Professional and practice skills
c1	Correct the common mistakes in a technical report.
c2	Make a correct presentation of quantitative data in table and graph forms.
c3	Write a technical report
d.	General and transferable skills
d1	Communicate with others effectively.

4. Assessment and Feedback Strategy

- Summative Assessment Methods:
  - Assignments
  - Mid-Term
  - Final Exam Teaching and Learning Methods

5. Teaching and Learning Methods

  - Online Lecture with Microsoft teams
  - Tutorial
  - Self-Learning

6. List of References

- … The Handbook of Technical Writing Eleventh Edition by Gerald J. Alred, Charles T. Brusaw, Walter E. Oliu, 2015
- Technical Writing Process: The simple, five-step guide that anyone can use to create technical documents such as user guides, manuals, and procedures Kindle Edition by Kieran Morgan , Sanja Spajic, Ali McCart 2015
- Technical Writing 101: A Real-World Guide to Planning and Writing Technical Content 3rd Edition, Kindle Edition by Alan S. Pringle , Sarah S. O'Keefe, 2009.
- The Craft of Scientific Writing 4th ed. 2018 Edition, by Michael Alley, 2018.

- Technical Communication (14th Edition) 14th Edition by John M. Lannon , Laura J. Gurak, 2016.
- Technical Report Writing Today 10th Edition by Daniel Riordan, 2014.

7. ILOs Mapping with Level of Competencies

ILOs	Level of Competences			
	A5	A8	A9	A10
a.Knowledge and understanding				
a1			X	x
a2				x
a3	X	X		
a4	X	X		x
b. Intellectual skills				
b1				
b2			X	x
b3		x		
c. Professional and practice skills				
c1				x
c2	X	x		
c3		x	X	
d. General and transferable skills				
d1		x	X	x

8. Study Plan

Week	Course Content	Lecture Hours	Tutorial Hours	Total Hours
1	Technical Writing Style	2	2	4
2	Content and Appearance	2	2	4
3	Content and Appearance	2	2	4
4	Typography and Writing	2	2	4
5	Formal Technical Report	2	2	4
6	Infographics	2	2	4
7	Infographics	2	2	4
8	Mid-term	2	2	4
9	Letter, memo, and email	2	2	4
10	Engineering Reports	2	2	4
11	Social Media and Higher Education	2	2	4
12	Social Media and Higher Education	2	2	4
13	Comunication skills	2	2	4
14	Presentation skills	2	2	4
15	Presentation skills	2	2	4
Total Number of Hours		30	30	60

9. Course Content / ILO Matrix

Wk	Course Content	a1	a2	a3	a4	b1	b2	b3	c1	c2	c3	d1
1	Technical Writing Style	x				x			X			x
2	Content and Appearance	x				x			X			x
3	Typography and Writing	x				x			X			x
4	Formal Technical Report	x	x			x			X			x
5	Infographics		x			x	x		X	x		x
6	Letter, memo, and email		x			x	x	x	X		x	x
7	Engineering Reports	x	x			x	x		X		x	X
8	Social Media and Higher Education				x			x				x
9	Comunication skills			x			x			x		x
10	Presentation skills			x			x			X		x

10. Assessment Methods / ILO Matrix

Assessment	a1	a2	a3	a4	b1	b2	b3	c1	c2	c3	d1
Assignments	x	x			x	x		x	X		x
Quizzes	x	x				x		x	X		
Mid-Term Exam	x	x			x			x		x	
Final Exam	x	x	x	x	x	x	x	x	X	x	

11. Learning Method / ILO Matrix

Learning Method	a1	a2	a3	a4	b1	b2	b3	c1	c2	c3	d1
Interactive Lecture	x	x	x	x	x	x	x				X
Tutorial	x	x	x	x	x	X	x	x	X	x	x
Self-Learning			x	x					X		

Course Specifications

1. Basic Information

ASU113	**Professional Ethics and Legislations**		3 CH
Prerequisites			
Number of weekly Contact Hours			
Lecture	Tutorial	Laboratory	
2	2	0	
Required SWL	100	Equivalent ECTS	4
Course Content			
Introduce undergraduate engineering students to the concepts, theory and practice of engineering ethics. It will allow students to explore the relationship between ethics and engineering and apply classical moral theory and decision making to engineering issues encountered in academic and professional careers, broaden student mind to be open to society's ever changing character, how to share ideas and concepts regardless of the fact that you may not always agree, working in teams on majority of the assignments in this course, exposure to national legislation related to education and engineering ethics.			
Used in Program / Level			
Program Name or requirement	Study Level		
University Requirement	1-4		
Assessment Criteria			
Student Activities	Mid-Term Exam	Practical Exam	Final Exam
20%	20%	0%	60%

2. Course Aims

The aim of this course is to support students to:

1. Recognize value, roles and responsibilities of Engineering,
2. Differentiate between different types of tendering and contracts.
3. Acknowledge methods used for solving and dealing with conflicts,
4. Understand the different dimensions for Engineering ethics.

3. Competencies and LO Mapping

0- As a university requirement course, this course supports the Engineering Graduate to be aware of national, regional and international contemporary issues, to have an intellectual and enlightened personality and to interact effectively in the community through different communication skills.

4. Learning Outcomes (LOs)

Cognitive Domain	
1	Recognize value, roles and responsibilities of Engineering, Engineering ethics in different Engineering projects.
2	Analyze Engineering issues to solve general Engineering problems and conflicts.
3	Distinguish between different types of tendering and contracts.
Psychomotor Domain	
4	Act ethically while solving conflicts raising through the life cycle of the Engineering projects.
Affective Domain	
5	Be a model for community in the daily activities

5. Course LOs Mapping with Level of Competencies

LOs	Competences
	0
Cognitive Domain	
1	√
2	√
3	√
Psychomotor Domain	
4	√
Affective Domain	
5	√

6. Assessment and Feedback Strategy

Summative Assessment Methods	Formative Assessment Methods
• Assignments • Presentation • Quizzes - Online + Written • Written exams (midterm & Final term)	• Pop quizzes • In class discussion

7. Teaching and Learning Methods

- ‘Asynchronous’ Pre-loaded & Interactive ‘synchronous’ Lectures (On-campus and/or Distance learning-based)
- Tutorial (On-campus and/or Distance learning-based)
- Collaborating learning (Team Project)
- Self-Learning

8. List of References

- Egyptian Code of Practice for Project Management in the construction field.
- FIDIC.
- Egyptian Engineers Syndicate bylaw and regulations.
- Egyptian Federation for Constructions and Building Contractors bylaw and regulations.
- Law of Work in Egypt
- Law of Building in Egypt

9. Study Plan

Week	Course Content	Lecture	Tutorial	Total
1	Introduction	2	2	4
2	Stages for Engineering Projects I	2	2	4
3	Stages for Engineering Projects II	2	2	4
4	Stages for Engineering Projects III	2	2	4
5	Engineering Contracts Rules and Regulations	2	2	4
6	Types of Engineering Contracts I	2	2	4
7	Types of Engineering Contracts II	2	2	4
8	Methods for Tendering	2	2	4
9	Engineering Ethics	2	2	4
10	Claims and Disputes	2	2	4
11	Amicable Settlements I	2	2	4
12	Amicable Settlements II	2	2	4
13	Rules for Practicing Engineering Profession	2	2	4
14	Rules for Egyptian Federation for Constructions and Building Contractors	2	2	4
15	Engineering Integrity	2	2	4
Total		**30**	**30**	**60**

10. Course Content / LO Matrix

week	Course Content	LO1	LO2	LO3	LO4	LO5
1	Introduction	√	√			
2	Stages for Engineering Projects I	√				
3	Stages for Engineering Projects II	√				
4	Stages for Engineering Projects III	√				
5	Engineering Contracts Rules and Regulations	√	√	√		
6	Types of Engineering Contracts I	√	√	√		
7	Types of Engineering Contracts II	√	√	√		
8	Methods for Tendering	√	√	√		
9	Engineering Ethics	√	√		√	√
10	Claims and Disputes	√	√		√	√
11	Amicable Settlements I	√	√		√	√
12	Amicable Settlements II	√	√		√	√
13	Rules for Practicing Engineering Profession	√	√	√		
14	Rules for Egyptian Federation for Constructions and Building Contractors	√	√	√		
15	Engineering Integrity	√	√			√

11. Assessment Methods / LO Matrix

Assessment	LO1	LO2	LO3	LO4	LO5
Assignments	√	√	√		
Presentation	√	√	√	√	√
Quizzes - Online + Written	√	√	√		
Written exams (midterm & Final term)	√	√	√		

12. Learning Method / LO Matrix

Learning Method	LO1	LO2	LO3	LO4	LO5
‘Asynchronous’ Pre-loaded & Interactive ‘synchronous’ Lectures (On-campus and/or Distance learning-based)	√	√	√	√	√
Tutorial (On-campus and/or Distance learning-based)	√	√	√	√	√
Collaborating learning (Team Project)	√	√	√	√	
Self-Learning	√	√	√	√	√

Course Specification

1. Basic Information

<table>
<tr><td>ASU 114</td><td colspan="2">Selected Topics in Contemporary issues</td><td>2 CH</td></tr>
<tr><td>Prerequisites</td><td colspan="3"></td></tr>
<tr><td colspan="4">Number of weekly Contact Hours</td></tr>
<tr><td>Lecture</td><td colspan="2">Tutorial</td><td>Laboratory</td></tr>
<tr><td>2</td><td colspan="2">0</td><td>0</td></tr>
<tr><td>Required SWL</td><td>50</td><td>Equivalent ECTS</td><td>2</td></tr>
<tr><td colspan="4">Course Content</td></tr>
<tr><td colspan="4">Exposure to national mega projects in different disciplines relate to water, energy an food security. Importance of multidisciplinary thinking, project management basics related to national projects,, pressing engineering issues depending on the timing of the course such as effect of sea level rise and the GERD dam in Ethiopia on Egypt</td></tr>
<tr><td colspan="4">Used in Program / Level</td></tr>
<tr><td colspan="3">Program Name or requirement</td><td>Study Level</td></tr>
<tr><td colspan="3">University requirement</td><td>1-4</td></tr>
<tr><td colspan="4">Assessment Criteria</td></tr>
<tr><td>Student Activities</td><td>Mid-Term Exam</td><td>Oral jury</td><td>Final Exam</td></tr>
<tr><td>35%</td><td>25%</td><td>0%</td><td>40%</td></tr>
<tr><td>Exam Duration [Hours]</td><td></td><td></td><td>3Hrs</td></tr>
<tr><td colspan="4">Equivalent to other course in another university</td></tr>
<tr><td>University</td><td colspan="3">UEL</td></tr>
<tr><td>Course code and title</td><td colspan="3"></td></tr>
</table>

Version: 180730

2. Course Aims

The course aims to familiarize the students with the ongoing and previous national mega projects related to water, energy and food security while considering the different effects on human settlements and the built environment. It also aims to develop the ability of understanding the dynamics of large scale projects.

3. Program Competencies served by course

- **A: Faculty Requirements (A5, A8)**
    - **A5. Practice research techniques and methods of investigation as an inherent part of learning.**
    - **A8:** Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.

- **D: Program Competences (D8)**
    - **D8**: Judge engineering decisions considering balanced costs, benefits, risks, safety, quality, reliability, and environmental impact, while having adequate knowledge of industries, organizations, regulations and procedures involved.

4. Learning Outcomes (LOs)

a.	Knowledge and understanding
a1	Relate the relevant Mega national projects in relation to Energy, water and Food Security.
a2	Outline the main challenges and opportunities related to Mega national projects and their contextual impacts.
a3	Relate the Sustainable Development Goals with the Mega national projects.
a4	Identify appropriate approaches in dealing with the water, energy and food security issues.
a5	Illustrate some graphical presentation techniques.
b.	Intellectual skills
b1	Integrate relationships of environmental aspects, economical aspects and social aspects, to achieve a sustainable Mega Project.
b2	Breakdown multipurpose complex Mega National projects into manageable inter-relatable partial components
b3	Compare different design and planning decisions and sort them in terms of priorities when analyzing a Mega national project.
b4	Review and criticize similar and existing projects.
b5	Analyze site and environmental contexts and features.
c.	Professional and practice skills
c1	Develop proper research skills
c2	Apply proper research methodologies
c3	Acquire needed presentation techniques
d.	General and transferable skills
d1	Work in stressful environment and within constrains
d2	Communicate effectively.
d3	Effectively manage tasks, time, and resources.

Cognitive Domain	
1	Identify appropriate approaches in dealing with the water, energy and food security issues.
2	Apply the Sustainable Development Goals with the Mega national projects.
3	Compare different design and planning decisions and sort them in terms of priorities when analyzing a Mega national project.
Psychomotor Domaine	
4	Acquire needed presentation techniques
Affective Domaine	
5	Manage tasks, time, and resources effectively.

5. Course LOs Mapping with Level of Competencies

LOs	Competences		
	A5	**A8**	**D8**
Cognitive Domain			
1	●		●
2	●		●
3	●	●	●
Psychomotor Domaine			
4		●	
Affective Domaine			
5		●	

6. Assessment and Feedback Strategy

- Formative Assessment Methods:
  - Presentation of research topics
  - In-Class Discussion
- Summative Assessment Methods:
  - Team Project.
  - Written Exams.

7. Teaching and Learning Methods

- Interactive Lectures
- Self-Readings
- Collaborating learning (Team Researches)

8. List of References

- Samaan, M, 2018, The Nile Development game: Tug of war or benefits for all?,
- Madrigal and Stoft, 2012, Transmission expansion for renewable energy: Scale Up
- Omran, E and Negem, a., 2020, Climate change impacts on agriculture and food security in Egypt

9. Study Plan

Week	Course Content	Lecture Hours	Tutorial Hours
1	**Introduction / SDGs**	2	0
2	Water: High Dam	2	0
3	Water Rain Harvest techniques	2	0
4	Water Desalination projects in Egypt	2	0
5	Presentation by the students	2	0
6	Energy: Nuclear Power station in Dabaa	2	0
7	**MIDTERM Exam**	2	0
8	Energy: Solar and Wind energy projects	2	0
9	Presentation by the students	2	0
10	Energy: Gas fields explorations	2	0
11	Ethiopian Dam	2	0
12	Food Security: New Valley project	2	0
13	Food Security: Toshka project	2	0
14	Food Security: Million Feddans Projects	2	0
15	Presentation by the students	2	0
Total Number of Hours		30	0

10. Course Content / LOs Matrix

Topic	Course Content	1	2	3	4	5
1	**Introduction / SDGs**		●			
2	Water: High Dam	●	●	●		
3	Water Rain Harvest techniques	●	●	●		
4	Water Desalination projects in Egypt	●	●	●		
5	Presentation by the students				●	●
6	Energy: Nuclear Power station in Dabaa	●	●	●		
7	**MIDTERM Exam**	●	●	●		
8	Energy: Solar and Wind energy projects	●	●	●		
9	Presentation by the students				●	●
10	Energy: Gas fields explorations	●	●	●		
11	Ethiopian Dam	●		●		
12	Food Security: New Valley project	●	●	●		
13	Food Security: Toshka project	●	●	●		
14	Food Security: Million Feddans Projects	●	●	●		
15	Presentation by the students				●	●

11. Assessment and Feedback Strategies / LOs Matrix

Assessment	1	2	3	4	5
Assignments (Presentations)	●	●	●	●	●
In Class Discussion				●	●
Mid-Term Exam	●	●	●		
Final Exam	●	●	●		

12. Teaching & Learning Methods / LOs Matrix

Learning Method	1	2	3	4	5
Interactive Lectures	●	●	●		
Self-Readings				●	●

Course Specification

1. Basic Information

<table>
<tr><td>ASU322</td><td colspan="5">Language Course</td><td>2 CH</td></tr>
<tr><td>Prerequisites</td><td colspan="6"></td></tr>
<tr><td colspan="7">Number of weekly Contact Hours</td></tr>
<tr><td colspan="2">Lecture</td><td colspan="3">Tutorial</td><td colspan="2">Laboratory</td></tr>
<tr><td colspan="2">2</td><td colspan="3">1</td><td colspan="2">0</td></tr>
<tr><td>Required SWL</td><td>75</td><td colspan="2">Equivalent ECTS</td><td colspan="3">3</td></tr>
<tr><td colspan="7">Course Content</td></tr>
<tr><td colspan="7">Study of the basics of a language different from English, such as German or French, grammar rules, selected text related to engineering, translation into Arabic, writing an essay in the chosen language along with its translation.</td></tr>
<tr><td colspan="7">Used in Program / Level</td></tr>
<tr><td colspan="4">Program Name or requirement</td><td colspan="3">Study Level</td></tr>
<tr><td colspan="4">University requirement Elective</td><td colspan="3">1-4</td></tr>
<tr><td colspan="7">Assessment Criteria</td></tr>
<tr><td>Student Activities</td><td colspan="2">Mid-Term Exam</td><td colspan="2">Practical Exam</td><td colspan="2">Final Exam</td></tr>
<tr><td>35%</td><td colspan="2">25%</td><td colspan="2">0%</td><td colspan="2">40%</td></tr>
</table>

2. **Overall aims of course**
By the end of this course, the student will be able to: • understand and use familiar everyday expressions and very basic phrases. • interact in a simple way provided the other person talks slowly and clearly and is willing to help. • understand sentences and frequently used expressions (e.g. very basic personal and family information, shopping, local geography, employment). • introduce him/herself and others and can ask and answer questions about personal information: where he/she lives, people he/she knows and things he/she has. • identify office/ working hours in announcements or signs • follow direction signs in a building • use dictionaries • collect information from a business card, find information about a trip

3. Program Competencies Served by Course.

A: Faculty Requirements (A5, A8)

A5. Practice research techniques and methods of investigation as an inherent part of learning

A8. Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.

4. Learning Outcomes (LOs)

Cognitive Domain	
1	Recognize articles, pronouns, simple grammatical structures and sentence patterns.
2	Recognize Names and understand numbers, quantities, times and prices.
Psychomotor Domaine	
3	Prepare, and write a letter and short personal messages and conclude relevant information from short written messages.
4	Introduce him/herself in a conversation and others and can ask and answer questions about personal details.
Affective Domaine	
5	Display teamwork and share ideas effectively
6	Show abilities of self-learning in reading and understanding texts.

5. Course LOs Mapping with Level of Competencies

LOs	Level of Competencies	
	A5	**A8**
1		●
2		●
3	●	
4		●
5	●	
6	●	

6. Assessment and Feedback Strategy

- Summative Assessment Methods:
  - Assignments (online, written)
  - Quizzes (online, written)
  - Mid-Term
  - Final Exam.

7. Teaching and Learning Methods

- Lecture (including face to face & distance by using Zoom platform)
- Tutorial (including face to face & distance by using Zoom platform - – activity submission and assessment through MOODLE)
- Self-Learning
- Practical

8. List of References

Sandra Evans; Angela Pude; Frany Specht (2012): Menschen. Deutsch als Fremdsprache. Kursbuch. Hueber Verlag: München. ISBN 978-3-19-301901-1

9. Study Plan

Week no	Course Content	Lecture	Tutorial	Total
1	Welcome and Introduction	2	1	3
2	Personal Information and occupations	2	1	3
3	The German alphabet; Family	2	1	3
4	Numbers from 100; Products	2	1	3
5	Furniture and shopping	2	1	3
6	Listening exercises	2	1	3
7	Office and technology	2	1	3
8	Leisure and complements	2	1	3
9	Leisure and appointments	2	1	3
10	Food, invitation at home	2	1	3
11	Travel and transport	2	1	3
12	Talks about arrival	2	1	3
13	Daily routine	2	1	3
14	Festivals	2	1	3
15	Revision	2	1	3
Total		30	15	45

10. Course Content / LO Matrix

wk	Course Content	1	2	3	4	5	6
1	Welcome and Introduction				●		
2	Personal Information and occupations			●	●	●	●
3	The german alphabet; Family	●			●		●
4	Numbers from 100; Products		●				●
5	Furniture and shopping	●	●	●	●	●	
6	Listening exercises	●		●			●
7	Office and technology	●		●		●	●
8	Leisure and complements	●			●	●	
9	Leisure and appointments	●	●	●	●	●	
10	Food, invitation at home				●		●
11	Travel and transport		●	●		●	
12	Talks about arrival			●	●		
13	Daily routine	●		●	●		●
14	Festivals	●		●			●

11. Learning Method / ILO Matrix

Learning Method	1	2	3	4	5	6
Lecture (including face to face & distance by using Zoom platform)	●	●	●	●	●	
Tutorial (including face to face & distance by using Zoom platform)	●	●	●	●	●	●

12. Assessment Methods / ILO Matrix

Assessment	1	2	3	4	5	6
Assignments, Reports and Project (online, written)	●	●			●	●
Written Exam (Midterm)	●	●		●		
Quizzes (online, written)	●	●		●		
Attendance and Participation	●	●		●	●	●
Written Exam (Final Exam)	●	●	●	●		

Course Specifications

1. Basic Information

<table>
<tr><td>ASU323</td><td colspan="3">Introduction to Accounting</td><td>3 CH</td></tr>
<tr><td>Prerequisites</td><td colspan="4"></td></tr>
<tr><td colspan="5">Number of weekly Contact Hours</td></tr>
<tr><td>Lecture</td><td colspan="2">Tutorial</td><td colspan="2">Laboratory</td></tr>
<tr><td>2</td><td colspan="2">1</td><td colspan="2">0</td></tr>
<tr><td>Required SWL</td><td>5</td><td>Equivalent ECTS</td><td colspan="2">3</td></tr>
<tr><td colspan="5">Course Content</td></tr>
<tr><td colspan="5">Financial reporting process and uses of accounting data. Basic accounting equation. Financial statements. Cost accounting concepts. Classifications of costs. Full absorption costing and variable costing. Variable costing and activity-based costing (ABC). Cost-volume-profit analysis (CVP). Break-even analysis. Budgeting. Production budget and direct materials budget. Decision making and control. Drop or add Product Decision, Make or Buy decision, and limiting factor.</td></tr>
<tr><td colspan="5">Used in Program / Level</td></tr>
<tr><td colspan="3">Program Name or requirement</td><td colspan="2">Study Level</td></tr>
<tr><td colspan="3"></td><td colspan="2">1</td></tr>
<tr><td colspan="5">Assessment Criteria</td></tr>
<tr><td>Student Activities</td><td>Mid-Term Exam</td><td>Practical Exam</td><td colspan="2">Final Exam</td></tr>
<tr><td>20%</td><td>20%</td><td>0%</td><td colspan="2">60%</td></tr>
</table>

2. Course Aims

This course introduces basic concepts of accounting. It also introduces basic concepts of cost accounting and management accounting.

3. Competencies and LO Mapping

A1. Show the effect of business transactions on the basic accounting equation.

A2. Prepare financial statements of the business.

B1. Make classifications of costs for a manufacturing company.

B2. Using cost information for budgeting and decision making.

Learning Outcomes (LOs)

Cognitive Domain	
1	Show the effect of business transactions on the basic accounting equation and preparing financial statements.
2	Explain the classifications of costs for a manufacturing company.
3	Using full absorption costing and variable costing.
Psychomotor Domain	
4	Compute the break-even point and margin of safety for the business.
Affective Domain	
5	Preparing budget for the business and making short-term decisions.

Mapping

LOs	Competences			
	A1	**A2**	**B1**	**B2**
Cognitive Domain				
1	●	●		
2			●	
3		●	●	
Psychomotor Domain				
4	●	●	●	●
Affective Domain				
5		●	●	●

4. Assessment and Feedback Strategy

- Assignments (Online using LMS and Written)
- Quizzes (Written)
- Written, set-in, Examination (Final and Midterm Exams)

5. Teaching and Learning Methods

- Lectures and interactive lectures using Microsoft Teams + Uploaded Videos

6. List of References

Weygandt, Kimmel, & Kieso, (2018), Accounting Principles, (John Wiley & Sons, Inc.)

7. Study Plan

Week	Course Content	Lecture	Tutorial	Total
1	Financial reporting process and uses of accounting data.	**2**	**1**	**3**
2	Basic Accounting Equation.	**2**	**1**	**3**
3	Financial Statements.	**2**	**1**	**3**
4	Cost accounting concepts.	**2**	**1**	**3**
5	Classifications of Costs.	**2**	**1**	**3**
6	Full Absorption Costing and Variable Costing	**2**	**1**	**3**
7	Variable costing and Activity-Based Costing (ABC).	**2**	**1**	**3**
8	Cost -Volume-Profit analysis (CVP).	**2**	**1**	**3**
9	Break-Even Analysis.	**2**	**1**	**3**
10	Net income and margin of safety given the break-even point	**2**	**1**	**3**
11	Budgeting	**2**	**1**	**3**
12	Master budget.	**2**	**1**	**3**
13	Production Budget and Direct Material Budget.	**2**	**1**	**3**
14	Decision making and control.	**2**	**1**	**3**
15	Drop –or- add, and make- or- buy decisions.	**2**	**1**	**3**
Total		**30**	**15**	**45**

8. Course Content / LO Matrix

week	Course Content	LO1	LO2	LO3	LO4	LO5
1	Financial reporting process and uses of accounting data.	●				
2	Basic Accounting Equation	●		●		
3	Financial Statements.	●	●			
4	Cost accounting concepts.	●				●
5	Classifications of Costs.	●	●			
6	Full Absorption Costing and Variable Costing	●		●		

7	Variable costing and Activity-Based Costing (ABC).	●			●	
8	Cost -Volume-Profit analysis (CVP).	●		●		
9	Break-Even Analysis.	●	●		●	
10	Net income and margin of safety given the break-even point	●			●	
11	Budgeting		●			●
12	Master budget.			●		●
13	Production Budget and Direct Material Budget.	●				●
14	Decision making and control.		●			●
15	Drop –or- add, and make- or- buy decisions.	●	●			

9. Assessment Methods / LO Matrix

Assessment	LO1	LO2	LO3	LO4	LO5
Assignments					●
Mid-Term	●	●	●	●	
Final Exam	●	●	●	●	

10. Learning Method / LO Matrix

Learning Method	LO1	LO2	LO3	LO4	LO5
Lecture	●	●	●	●	●
Tutorial			●	●	●
Self-learning					●

Course Specification

1. Basic Information

<table>
<tr><td>ASU324</td><td colspan="3">History of Engineering and Technology</td><td colspan="2">2 CH</td></tr>
<tr><td>Prerequisites</td><td colspan="5"></td></tr>
<tr><td colspan="6">Number of weekly Contact Hours</td></tr>
<tr><td colspan="2">Lecture</td><td colspan="2">Tutorial</td><td colspan="2">Laboratory</td></tr>
<tr><td colspan="2">2</td><td colspan="2">1</td><td colspan="2">0</td></tr>
<tr><td>Required SWL</td><td>75</td><td colspan="2">Equivalent ECTS</td><td colspan="2">3</td></tr>
<tr><td colspan="6">Course Content</td></tr>
<tr><td colspan="6">Provide students with an understanding of the historical development of Engineering with relation to societal expectations of the period, Interaction between human society and Engineers to develop and guide the advancement of engineering technology; with society posing problems for Engineers to solve and Engineers developing new technology that changed the course of human history, and helped shape the world we live in, General philosophy behind Engineering work to fulfil the needs of society (water, electricity, technological improvements etc.), The role of engineers in society from a humanistic perspective, Other relevant philosophical analyses of Engineering as a skill and profession such as, aesthetics, creativity, the epistemology of Engineering and more. Examples from the contributions of Arab Scientists in different fields.</td></tr>
<tr><td colspan="6">Used in Program / Level</td></tr>
<tr><td colspan="4">Program Name or requirement</td><td colspan="2">Study Level</td></tr>
<tr><td colspan="4">University Requirement Elective</td><td colspan="2">1-4</td></tr>
<tr><td colspan="6">Assessment Criteria</td></tr>
<tr><td>Student Activities</td><td>Mid-Term Exam</td><td colspan="2">Practical Exam</td><td colspan="2">Final Exam</td></tr>
<tr><td>20%</td><td>20%</td><td colspan="2">0%</td><td colspan="2">60%</td></tr>
</table>

2. Course Aims:

The aim of this course is to

- Get the student familiar with the definitions and the differences between art, science and engineering.
- Get the student familiar with different engineering periods and their main engineering inventions.
- Train the student how to find engineering information, both by traditional ways and through the Internet.
- Train the student how to prepare a report and deliver a presentation.

3. Competencies and LOs Mapping

A5: Practice research techniques and methods of investigation as an inherent part of learning.

A7: Function efficiently as an individual and as a member of multi-disciplinary and multi-cultural teams.

A8: Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.

Learning Outcomes – Los

Cognitive Domain	
LO1	Explain the meaning of engineering.
LO2	Outline the different engineering periods and discuss different historic inventions
Psychomotor Domaine	
LO3	Access and search the internet.
LO4	Prepare a Team report and Deliver a Team presentation
Affective Domaine	
LO5	Manage time, tasks and resources efficiently
LO6	Communicate effectively within teams

Dr. Ahmed Yakout, QD

Mapping

LOs	Competences		
	A5	**A7**	**A8**
Cognitive Domain			
LO1	●		
LO2	●		
Psychomotor Domaine			
LO3	●		
LO4		●	●
Affective Domaine			
LO5	●	●	●
LO6		●	●

4. Assessment and Feedback Strategy

1. Team Report (online)
2. Team Presentation (online)
3. Written examinations (midterm (online, written) & final term (written))

5. Teaching and Learning Methods

1. Lectures (distance using zoom/Microsoft teams) [100% Online]
2. Tutorials (distance by using zoom/Microsoft teams) [100% Online]
3. Watching related Videos
4. Library / Internet research on related topics.

6. List of References

a) Harms, Baetx, and Volt, Engineering in time, Imperial College Press, 2004
b) Marshall Brain, The Engineering Book: From the Catapult to the Curiosity Rover, 250 Milestones in the History of Engineering, 2015
c) Tom Jackson, Engineering: An Illustrated History from Ancient Craft to Modern Technology, 2016.
d) Instructors Recorded Microsoft teams' videos available on LMS.

7. Study Plan

Week	Course Content	Lecture Hours	Tutorial Hours
1	Introduction to Engineering	2	1
2	Prehistoric Engineering (The beginning of devices)	2	1
3	Prehistoric Engineering (The beginning of devices)	2	1
4	Ancient Engineering (Devices used by society)	2	1
5	Ancient Engineering (Devices used by Society)	2	1
6	Medieval Engineering (Society interests affecting engineering)	2	1
7	Mid Term Revision & Exam	2	1
8	Medieval Engineering (Society interests affecting engineering)	2	1
9	Renascent Engineering (New skills added to the engineering profession)	2	1
10	Renascent Engineering (New skills added to the engineering profession)	2	1
11	Expansive Engineering (Growth of Engineering)	2	1
12	Expansive Engineering (Growth of Engineering)	2	1
13	Modern Engineering (Recent specialties and future research)	2	1
14	Modern Engineering (Recent specialties and future research)	2	1
15	Final Revision	2	1
Total Number of Hours		**30**	**15**

8. Course Content / ILO Matrix

Wk	Course Content	LO1	LO2	LO3	LO4	LO5	LO6
1	Introduction to Engineering	√					
2	Prehistoric Engineering		√				
3	Prehistoric Engineering		√				
4	Ancient Engineering		√				
5	Ancient Engineering		√				
6	Medieval Engineering		√				
7	**Mid Term Exam**						
8	Medieval Engineering		√				
9	Renascent Engineering		√				
10	Renascent Engineering		√				
11	Expansive Engineering		√				
12	Expansive Engineering		√				
13	Modern Engineering		√				
14	Modern Engineering		√				
15	**Revision**	√	√				

9. Assessment Methods / ILO Matrix

Assessment	LO1	LO2	LO3	LO4	LO5	LO6
Team Report			√	√	√	√
Team Presentation				√		√
Mid-Term	√	√			√	
Final Exam	√	√			√	

10.Learning Method / ILO Matrix

Learning Method	LO1	LO2	LO3	LO4	LO5	LO6
Lectures (distance by using Microsoft Teams)	√	√				
Tutorials (distance by using Microsoft Teams)		√		√		√
Watching related Videos	√	√	√			
Internet Search			√		√	

Course Specification

1. Basic Information

ASU333	**Introduction to Marketing**			**2 CH**
Prerequisites				
Number of weekly Contact Hours				
Lecture		Tutorial		Laboratory
2		0		0
Required SWL	50	Equivalent ECTS		2
Course Content				
This course aims at educating students the concept of marketing: definition of marketing and its role in achieving organizational objectives, the importance of marketing, the marketing system, and organizing the marketing functions. The concept and aspects of the consumer behavior, studying the markets. Market mix, segmentation, targeting, and positioning. The product strategy: branding, packaging, product mix, product life cycle, new products development. The pricing strategy: The importance of pricing, Methods of pricing. Distribution strategy: distribution channels, distribution outlets. Promotion strategy: advertising and personal selling.				
Used in Program / Level				
Program Name or requirement			Study Level	
University Requirement			1-4	

Assessment Criteria			
Student Activities	Mid-Term Exam	Practical Exam	Final Exam
20%	**0%**	**0%**	**80%**
Exam Duration [Hours]			2Hrs.
Equivalent to other course in another university			
University	N/A		
Course code and title	N/A		

Version: 180730

2. Course Aims

By the end of the course the students will be able to:

- Identify and evaluate the fundamental concepts and theories of marketing.
- Describe the variables, techniques, and the processes used to segment markets.
- Develop a critical understanding of the role of marketing in a firm's overall strategy;
- Develop Product and Pricing Strategy; types of marketing channels; Distribution and Promotion Strategies.
- The student shall attain the above mentioned objectives efficiently under controlled guidance and supervision while gaining the experience through the introduction of case studies that illustrate the techniques described in the course.

3. Intended Learning Outcomes (ILOs)

a.	Knowledge and understanding
a1	Identify the concepts of marketing and describe marketing functions
a2	Explain how to apply the key frameworks and tools for analyzing customers, competition, marketing positioning, and marketing strengths and weaknesses.
a3	Describe market segmentation.
a4	Define Marketing Mix: Identify the stages of the product life cycle; components of industrial and consumer markets.
b.	Intellectual skills
b1	Interpret the need for marketing planning.
b2	Categorize the variables, techniques, and the processes used to segment markets.
b3	Apply Product and Pricing Strategy; types of marketing channels; Distribution and Promotion Strategies.
b4	Apply the relationships among the elements of the marketing mix.
c.	Professional and practice skills
c1	Develop the nature and basic concepts of marketing.
c2	Formulate the applications of marketing principles in the real world, and equip them with the skills to develop a simple marketing plan.
c3	Develop an essential foundation for those planning to continue with more advanced marketing coursework and gives an overview to those who will take only one marketing course.
c4	N/A
d.	General and transferable skills
d1	Conduct oral and written presentations.
d2	Practice working in a team to develop communication skills.
d3	Creative thinking through case studies, assignments, classroom discussions.
d4	Adaptability to change through case studies and examinations.

4. Assessment and Feedback Strategy

Must consider formative and summative assessment Methods

Assignments

Written examination (final term)

5. Teaching and Learning Methods

- Interactive Lectures **Due to CORONA pandemic and the instructions to avoid dangers, the lectures and tutorials were on line via Microsoft teams. This is explained clearly in details with the links in the course report.**
- Self-Readings
- Problem Solving
- Collaborating learning (Team Project)

6. List of References

Philip Kotler, Gary Armstrong,2017, **Principles of Marketing;** fourteenth Edition (Global Edition) ISBN 978-013-61- 243- 4, Publisher: Prentice Hall

7. Study Plan

Week	Course Content	Lecture Hours
1	Introduction	2
2	Build customer relationship	2
3	Strategic market plan	2
4	Creating value for target customer	2
5	Segment, Target and Position	2
6	Product management	2
7	Product development and strategy	2
8	Pricing	2
9	Price elasticity of demand	2
10	Pricing strategy	2
11	Distribution Channel	2
12	Supply Chain Management	2
13	communication	2
14	Promotion Strategy	2
15	Marketing by numbers	2
Total Number of Hours		**30**

8. Assessment schedule

Assessment method	Description	Marks(100)
Assignment	Assignment 1: Product	**5**
Assignment	Assignment 2: Report	**15**
Written exam	Final exam	**80**

9. Course Content / ILO Matrix

Wk	Course Content	a1	a2	a3	a4	b1	b2	b3	b4	c1	c2	c3	d1	d2	d3	d4
1	Introduction															
2	Build customer relationship	●		●		●	●	●		●			●	●		
3	Strategic market plan		●	●							●	●	●		●	
4	Creating value for target customer		●			●	●		●				●			●
5	Segment, Target and Position	●		●	●					●	●				●	
6	Product management				●							●				●
7	Product development and strategy				●					●	●				●	
8	Pricing				●									●		
9	Price elasticity of demand				●									●		●
10	Pricing strategy				●					●	●				●	
11	Distribution Channel		●		●									●		
12	Supply Chain Management		●		●								●			
13	communication				●			●				●				
14	Promotion Strategy				●			●		●	●				●	
15	Marketing by numbers				●					●				●		

10. Assessment Methods / ILO Matrix

Assessment	a1	a2	a3	a4	b1	b2	b3	b4	c1	c2	c3	d1	d2	d3	d4
Assignments	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Final Exam	●	●	●	●	●	●	●	●	●	●	●				

11. Learning Method / ILO Matrix

Learning Method	a1	a2	a3	a4	b1	b2	b3	b4	c1	c2	c3	d1	d2	d3	d4
Interactive Lectures (ON LINE)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Self-Readings	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

12. ILOs Mapping with Level of Competencies

- A: Faculty Requirements (A6, A8, A10)
  - **A6:** Plan, supervise and monitor implementation of engineering projects.
  - **A8:** Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.
  - **A10**: Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.

ILOs	Level of Competences		
	A6	A8	A10
a.			
a1			●
a2	●		●
a3	●		●
a4	●		●
b.			
b1	●		
b2			●
b3	●		
b4	●		
c.			
c1	●	●	
c2	●	●	
c3		●	●
d.			
d1	●	●	
d2	●		
d3		●	
d4		●	

Course Specification

1. Basic Information

ASU336	Business Administration	2 CH
Prerequisites		

Number of weekly Contact Hours		
Lecture	Tutorial	Laboratory
2	0	0

Required SWL	50	Equivalent ECTS	2

Course Content

The nature of business and entrepreneurship as the vehicle for making money by creating wealth and producing goods and services. Management, Planning, Controlling and Organizing. Various functional areas in business including: accounting, entrepreneurship, economics, finance management and marketing, legal environment of business, globalization and e-business.

Used in Program / Level	
Program Name or requirement	Study Level
University Requirement Elective	1-4

Assessment Criteria			
Student Activities	Mid-Term Exam	Practical Exam	Final Exam
20%	0%	0%	80%
Exam Duration [Hours]	---	---	2 Hrs

Equivalent to other course in another university	
University	N/A
Course code and title	N/A

2. Course Aims

The aim of this course is to provide students with the basic knowledge and skills needed to understand the businesses nature, concepts and challenges. Students will be introduced to wide range of business and management topics enabling them to perform efficiently and effectively as graduates more senior roles were, they are likely to have broader responsibilities.

3. Course Learning Outcomes (LOs)

Cognitive Domain	
1	Recognize basic business concepts
2	Apply management roles to various types of businesses
3	Identify different types of managerial problems
Psychomotor Domain	
4	Construct a business model canvas.
Affective Domain	
5	Acknowledge the importance of Business Modelling

4. Assessment and Feedback Strategy

Formative Assessment Methods:

a. Pop Quizzes
b. In-Class (during the online lecture) Discussions.

Summative Assessment Methods:

c. Online Quizzes.
d. Written Final Exam.

5. Teaching and Learning Methods

- Online Lectures Using Microsoft teams on the following Teams link:
- https://teams.microsoft.com/l/team/19%3a6fbaed6883504c7b9fa820bfb9953629%40thread.tacv2/conversations?groupId=7322b1df-3561-417e-be46-573257a35448&tenantId=ad2a8324-bef7-46a8-adb4-fe51b6613b24
- Group discussion
- Self-learning
- Case study

6. List of References

- John R. Schermerhorn, Jr. and Daniel G. Bachrach, *"Introduction to Management"*, John Wiley & Sons, 13th edition 2015.

7. ILOs Mapping with Level of Competencies

LOs	Level of Competences					
	A0					
Cognitive Domain						
1	√					
2	√					

3	√					
Psychomotor Domain						
4	√					
Affective Domain						
5	√					

8. Study Plan

Week	Course Content	Lecture Hours	Tutorial Hours
1	Types of Businesses	2	0
2	Business Challenges	2	0
3	Value Chain	2	0
4	Value Proposition	2	0
5	Business Models	2	0
6	Business Model Canvas	2	0
7	Business Model Canvas (Cont.)	2	0
8	How to formulate a business Vision	2	0
9	How to formulate a business Mission	2	0
10	Development of Management	2	0
11	Management functions	2	0
12	Planning- & Organizing	2	0
13	Leading and Controlling	2	0
14	Organization Structures	2	0
15	Organization Structures (Cont.)	2	0
Total Number of Hours		30	

9. Course Content / LO Matrix

Wk	Course Content	1	2	3	4	5
1	Types of Businesses	√				
2	Business Challenges	√				
3	Value Chain				√	√
4	Value Proposition	√			√	
5	Business Models			√		
6	Business Model Canvas				√	
7	Business Model Canvas (Cont.)				√	√
8	How to formulate a business Vision			√		√
9	How to formulate a business Mission					√
10	Development of Management		√			
11	Management functions		v			
12	Planning- & Organizing		V			
13	Leading and Controlling			√		
14	Organization Structures			√		
15	Organization Structures (Cont.)			√		

10. Assessment Methods / LO Matrix

Assessment	1	2	3	4	5
Assignments					
Quizzes		√	√	√	√
Mid-Term Exam					
Practical Exam					
Final Exam	√	√	√	√	√

11. Learning Method / ILO Matrix

Learning Method	1	2	3	4	5
Lectures	√	√	√	√	√
Group discussion	√	√			
Self-learning			√		
Case study	√	√		√	√

All Lectures are online lectures using Microsoft Teams

Course Specification

1. Basic Information

PHM 011	**Basic Mathematics**		**0 CH**
Prerequisites	**NA**		
Number of weekly Contact Hours			
Lecture	Tutorial	Laboratory	
2 H	2 H	0 H	
Required SWL	100 H	Equivalent ECTS	4
Course Content			
Differential and integral calculus: Differentiation and its applications, The calculus of exponential and logarithmic functions, Behavior of functions and curve sketching, The definite integral and its application Analytic and solid geometry: Geometry and measurements in two and three dimensions, Straight lines and planes in space.			
Used in Program / Level			
Program Name or requirement	Study Level		
Faculty Requirement	**Level 0**		
Assessment Criteria			
Student Activities	Mid-Term Exam	Practical Exam	Final Exam
20 %	**20 %**	**0 %**	**60 %**
Exam Duration [Hours]	1 H		2 H
Equivalent to other course in another university			
University	NA		
Course code and title	NA		

2. Course Aims

The aim of this course is to provide students with the needed Mathematics knowledge and skills, which enable them to find the derivatives for all the studied in the secondary school as well as integrate them. Also provide students with deep knowledge in calculating areas and volumes as applications for definite integrals

3. Program Competencies Served by Course.

- A: Faculty Requirements (A1, A2, A8)

  - **A1**: Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.
  - **A2**: Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess, and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.

4. Learning Outcomes (LOs)

Cognitive Domain	
1	Recognize different types of functions, their derivatives and anti-derivatives.
2	Identify the differences between techniques of integration in solving many definite and indefinite integrals.
3	Identify lines and planes in space.
Psychomotor Domaine	
4	Use suitable course materials in solving many levels of difficult mathematical problems.
Affective Domaine	
5	Participates in class discussions.

5. Course LOs Mapping with Level of Competencies

LOs	Competences		
	A1	**A2**	
Cognitive Domain			
1	●	●	
2	●	●	
3		●	
Psychomotor Domaine			
4	●	●	
Affective Domaine			
5	●	●	

6. Assessment and Feedback Strategy

- Formative Assessment Methods:
    - Pop Quizzes
    - In-Class Discussion
- Summative Assessment Methods:
    - Assignments
    - In-Class problem solving.
    - Related-To- Self Reading Quizzes and discussions.
    - Written Exams.

7. Teaching and Learning Methods

- Interactive Lectures (Online Lectures)
- Self-learning
- Problem Solving

8. List of References

- Kamal Younis Kabsha, Afaf Abo Elfotouh & Cerafim Elias Skander, Pure Mathematics, Differential and Integral Calculus, Third Secondary – Ministry of Education.

- J. Stewart, "Single Variable Calculus", Brooks/Cole Publ. Co., Six Ed., **2015.** (EKB) - ISBN: 0534255973.

9. Study Plan

Week	Course Content	Lecture Hours	Tutorial Hours
1	Derivatives of trigonometric functions for explicit and implicit functions.	**2**	**2**
2	Equations of tangent and normal lines, related time rates.	**2**	**2**
3	The exponential and logarithmic functions.	**2**	**2**
4	Derivatives of exponential and logarithmic functions.	**2**	**2**
5	Integrals of exponential and logarithmic functions.	**2**	**2**
6	Local and absolute maximum and minimum values.	**2**	**2**
7	Curve sketching.	**2**	**2**
8	Applications of maximum and minimum.	**2**	**2**
9	Indefinite integrals.	**2**	**2**
10	Definite integrals.	**2**	**2**
11	Calculation of areas between curves.	**2**	**2**
12	Calculation of volumes of revolution.	**2**	**2**
13	Vectors in space.	**2**	**2**
14	Equations of planes.	**2**	**2**
15	Equations of straight lines in space.	**2**	**2**
Total Hours		**30**	**30**

10. Course Content / LOs Matrix

Topic	Course Content	1	2	3	4	5
1	Derivatives of trigonometric functions for explicit and implicit functions.	●			●	●
2	Equations of tangent and normal lines, related time rates.	●			●	●
3	The exponential and logarithmic functions.	●			●	●
4	Derivatives of exponential and logarithmic functions.	●			●	●
5	Integrals of exponential and logarithmic functions.	●			●	●
6	Local and absolute maximum and minimum values.	●	●		●	●
7	Curve sketching.	●			●	●
8	Applications of maximum and minimum.	●			●	●
9	Indefinite integrals.	●	●		●	●
10	Definite integrals.	●	●		●	●
11	Calculation of areas between curves.	●	●		●	●
12	Calculation of volumes of revolution.	●	●		●	●
13	Vectors in space.	●		●	●	●
14	Equations of planes.	●		●	●	●
15	Equations of straight lines in space.	●		●	●	●

11. Assessment and Feedback Strategies / LOs Matrix

Assessment	1	2	3	4	5
Assignments	●	●	●	●	●
In Class Discussion	●	●	●	●	●
Quizzes	●	●	●	●	
Mid-Term Exam	●	●	●	●	
Final Exam	●	●	●	●	

12. Teaching & Learning Methods / LOs Matrix

Learning Method	1	2	3	4	5
Interactive Lectures	●	●	●	●	●
Self-Readings	●	●	●	●	●
Problem Solving	●	●	●	●	●

Course Specification

1. Basic Information

<table>
<tr><td colspan="3">PHM 012s</td><td colspan="7">Mathematics (1)</td><td colspan="2">3 CH</td></tr>
<tr><td colspan="3">Prerequisites</td><td colspan="9">NA</td></tr>
<tr><td colspan="12">Number of weekly Contact Hours</td></tr>
<tr><td colspan="4">Lecture</td><td colspan="4">Tutorial</td><td colspan="4">Laboratory</td></tr>
<tr><td colspan="4">3 H</td><td colspan="4">2 H</td><td colspan="4">0 H</td></tr>
<tr><td colspan="3">Required SWL</td><td colspan="3">125 H</td><td colspan="3">Equivalent ECTS</td><td colspan="3">5</td></tr>
<tr><td colspan="12">Course Content</td></tr>
<tr><td colspan="12">According to Bylaw 2018:

Review of Calculus, Chain Rule, Hyperbolic Functions, Inverse Functions, Techniques of Integration. L'Hopital Rule, Conic Sections, Series.</td></tr>
<tr><td colspan="12">Used in Program / Level</td></tr>
<tr><td colspan="8">Program Name or requirement</td><td colspan="4">Study Level</td></tr>
<tr><td colspan="8">Faculty Requirement</td><td colspan="4">Level 0</td></tr>
<tr><td colspan="8"></td><td colspan="4"></td></tr>
<tr><td colspan="8"></td><td colspan="4"></td></tr>
<tr><td colspan="8"></td><td colspan="4"></td></tr>
<tr><td colspan="12">Assessment Criteria</td></tr>
<tr><td colspan="3">Student Activities</td><td colspan="3">Mid-Term Exam</td><td colspan="3">Practical Exam</td><td colspan="3">Final Exam</td></tr>
<tr><td colspan="3">20 %</td><td colspan="3">20 %</td><td colspan="3">0 %</td><td colspan="3">60 %</td></tr>
<tr><td colspan="3">Exam Duration [Hours]</td><td colspan="3">3 H</td><td colspan="3"></td><td colspan="3">3 H</td></tr>
<tr><td colspan="12">Equivalent to other course in another university</td></tr>
<tr><td colspan="3">University</td><td colspan="9">NA</td></tr>
<tr><td colspan="3">Course code and title</td><td colspan="9">NA</td></tr>
</table>

2. Course Aims

The aim of this course is to provide students with:

deep knowledge for techniques of integration. As will as use integration for different engineering applications. Also provide students with deep knowledge for conic sections and testing different kinds of series for convergence and divergence.

3. Intended Learning Outcomes (ILOs)

a.	Knowledge and understanding
a1	Recognize the different types of functions such as exponential, trigonometric and hyperbolic with their derivatives and anti-derivatives.
a2	Define the inverse functions for the function.
a3	Recognize the differences between techniques of integration, by parts, by partial fractional and by trigonometric substitution.
a4	Identify the conic sections, and the convergence of series..
b.	Intellectual skills
b1	Simplify the integration by techniques of integration..
b2	Apply different techniques of integration to solve engineering applications.
b3	Illustrate the differences techniques of integration, by parts, by partial fractional and by trigonometric substitution in some engineering applications.
b4	Analyze the conic sections, and the convergence of series.
c.	Professional and practice skills
c1	Select the suitable technique of integration to solve some engineering applications..
c2	NA
c3	NA
c4	NA
d.	General and transferable skills
d1	Work in a team, self learning & presentation skills.
d2	NA
d3	NA
d4	NA

4. Assessment and Feedback Strategy

- Online Assignments
- Online Quizzes
- Written examinations (Midterm & Final tem)

5. Teaching and Learning Methods

- Online Lectures
- Online Tutorials
- Self learning

6. List of References

- J.Stewart, "Single Variable Calculus", Brooks/Cole Publ. Co., Six Ed., **2015.** (EKB) - ISBN: 0534255973.
- H.Anton, "Elementary Linear Algebra with Applications", Brooks/Cole Publ. Co., Nine Ed., **2012.**(EKB) - ISBN: 0471433292.

7. ILOs Mapping with Level of Competencies

ILOs	Level of Competences					
	A1	**A2**				
a. Knowledge and understanding						
a1	√					
a2	√					
a3	√					
a4	√					
b. Intellectual skills						
b1		√				
b2		√				
b3	√					
b4	√					
c. Professional and practice skills						
c1	√	√				
c2						
c3						
c4						
d. General and transferable skills						
d1	√	√				
d2						
d3						
d4						

Study Plan

Week	Course Content (Part I)	Lecture Hours	Tutorial Hours
1	Differentiation Formulas	**3**	**2**
2	Integration Formulas	**3**	**2**
3	Fundamental Theorem of Calculus.	**3**	**2**
4	Inverse Functions.	**3**	**2**
5	Inverse Trigonometric Functions	**3**	**2**
6	Hyperbolic Functions.	**3**	**2**
7	Inverse Hyperbolic Functions. (Part 1)-Midterm	**3**	**2**
8	Inverse Hyperbolic Functions. (Part 2)	**3**	**2**
9	Indeterminate Forms and L'Hopital's Rule.	**3**	**2**
10	Techniques of Integration (Part 1)	**3**	**2**
11	Techniques of Integration (Part 2)	**3**	**2**
12	Conic Sections (Part 1)	**3**	**2**
13	Conic Sections (Part 2)	**3**	**2**
Total Number of Hours		**39**	**26**

Course Content / ILO Matrix

week	Course Content	a1	a2	a3	a4	b1	b2	b3	b4	c1	d1
1	Differentiation Formulas	√									
2	Integration Formulas	√									√
3	Fundamental Theorem of Calculus.	√				√					√
4	Inverse Functions.	√				√					√
5	Inverse Trigonometric Functions	√				√				√	√
6	Hyperbolic Functions.		√				√			√	√
7	Inverse Hyperbolic Functions. (Part 1)-Midterm		√				√			√	√
8	Inverse Hyperbolic Functions. (Part 2)		√	√			√			√	√
9	Indeterminate Forms and L'Hopital's Rule.			√						√	√
10	Techniques of Integration (Part 1)				√			√		√	√
11	Techniques of Integration (Part 2)								√	√	√
12	Conic Sections (Part 1)								√		√
13	Conic Sections (Part 2)								√		√

8. Assessment Methods / ILO Matrix

Assessment	a1	a2	a3	a4	b1	b2	b3	b4	c1	d1
Online Assignments		√	√			√			√	√
Online Quizzes	√			√	√		√	√	√	
Mid-Term (Written)	√	√	√		√	√				
Final Exam (Written)	√		√	√	√		√			

9. Learning Method / ILO Matrix

Learning Method	a1	a2	a3	a4	b1	b2	b3	b4	c1	d1
Online Lectures	√	√	√	√	√	√	√	√	√	
Online Tutorials			√	√						√
Self learning			√			√				

Course Specifications

1. Basic Information

<table>
<tr><td>PHM 013s</td><td colspan="2">Mathematics (2)</td><td>3 CH</td></tr>
<tr><td>Prerequisites</td><td colspan="3">PHM 012s – Mathematics (1)</td></tr>
<tr><td colspan="4">Number of weekly Contact Hours</td></tr>
<tr><td>Lecture</td><td>Tutorial</td><td colspan="2">Laboratory</td></tr>
<tr><td>3 H</td><td>2 H</td><td colspan="2"></td></tr>
<tr><td>Required SWL</td><td>125 H</td><td>Equivalent ECTS</td><td>5</td></tr>
<tr><td colspan="4">Course Content</td></tr>
<tr><td colspan="4">According to Bylaw 2018:

Functions of Several Variables, Partial Differentiation, Applications of Partial Differentiation, Quadric Surfaces, Coordinate Systems, Multiple Integrals and applications, Line Integral, Green’s Theorem, Linear System of Equations, Matrix Algebra, Eigenvalues</td></tr>
<tr><td colspan="4">Used in Program / Level</td></tr>
<tr><td colspan="3">Program Name or requirement</td><td>Study Level</td></tr>
<tr><td colspan="3">Faculty Requirements</td><td>Level 0</td></tr>
<tr><td colspan="3"></td><td></td></tr>
<tr><td colspan="4">Assessment Criteria</td></tr>
<tr><td>Student Activities</td><td>Mid-Term Exam</td><td>Practical Exam</td><td>Final Exam</td></tr>
<tr><td>20 %</td><td>20 %</td><td>0 %</td><td>60 %</td></tr>
<tr><td>Exam Duration [Hours]</td><td>1 H</td><td></td><td>3 H</td></tr>
<tr><td colspan="4">Equivalent to other course in another university</td></tr>
<tr><td>University</td><td colspan="3">NA</td></tr>
<tr><td>Course code and title</td><td colspan="3">NA</td></tr>
</table>

2. CourseAims

The aim of this course is to provide students with core material in the area of quadratic surfaces, functions of several variables, partial differentiation and multiple integrals. The course also teaches skills in solving systems of linear equations using matrix algebra.

3. Intended Learning Outcomes (ILOs)

a.	Knowledge and understanding
a1	Recognize the different types of surfaces in space such as spheres, cylinders and quadratic surfaces.
a2	Define the functions of several variables and their partial derivatives
a3	Discuss the different types of iterated integrals such as double, triple and line integrals in different types of coordinate systems.
a4	Identify the Matrix algebra and the solutions of linear systems of equations.
b.	Intellectual skills
b1	Analyze the equations of quadratic surfaces to sketch them in space.
b2	Apply the techniques of partial differentiation to solve engineering problems.
b3	Illustrate the different types of multiple integrals, line integrals and their applications in engineering problems.
b4	Solve linear systems of equations using matrix algebra.
c.	Professional and practice skills
c1	Select the appropriate technique of partial derivatives and multiple integrals to solve engineering applications.
c2	NA
c3	NA
c4	NA
d.	General and transferable skills
d1	Work in a team, self learning & presentation skills.
d2	NA
d3	NA
d4	NA

4. Assessment and Feedback Strategy

- Online Assignments
- Online Quizzes
- Written Midterm
- Written Final Examinations

5. Teaching and Learning Methods

- Lectures (On Campus)
- Tutorials (Online Sessions)
- Self learning

6. List of References

- James Stewart, “Calculus”, Metric International Version, 6e, 2015. Brooks/Cole Pub. (EKB) - **ISBN:** 9780495383628

- H.Anton, "Elementary Linear Algebra with Applications", Brooks/Cole Pub.9e, **2012.**(EKB) - ISBN: 0471433292.

7. ILOs Mapping with Level of Competencies

ILOs	Level of Competences					
	A1	**A2**				
a. Knowledge and understanding						
a1	√					
a2	√					
a3	√					
a4	√					
b. Intellectual skills						
b1		√				
b2		√				
b3	√					
b4	√					
c.						
c1	√	√				
c2						
c3						
c4						
d. General and transferable skills						
d1	√	√				
d2						
d3						
d4						

Study Plan

Week	Course Content	Lecture Hours	Tutorial Hours
1	Vectors and geometry of space, quadratic surfaces.	**3**	**2**
2	Functions of several variables and partial derivatives.	**3**	**2**
3	Applications of partial derivatives.	**3**	**2**
4	Double integrals over rectangular regions.	**3**	**2**
4	Double integrals over general regions.	**3**	**2**
5	Applications of double integrals.	**3**	**2**
6	Triple integrals (Part I).	**3**	**2**
7	Triple integrals in cylindrical and spherical coordinates.	**3**	**2**
8	Applications of triple integrals	**3**	**2**
9	Line integrals.	**3**	**2**
10	Green's theorem	**3**	**2**
11	Applications of Matrices	**3**	**2**
12	Eigen values and Eigen vectors	**3**	**2**
13	General Revision	**3**	**2**
Total Number of Hours		**39**	**26**

8. Course Content / ILO Matrix

	Course Content	a1	a2	a3	a4	b1	b2	b3	b4	c1	d1
1	Vectors and geometry of space, quadratic surfaces.	√				√					√
2	Functions of several variables and partial derivatives.		√				√				√
3	Applications of partial derivatives.		√				√			√	√
4	Double integrals over rectangular regions.			√							
4	Double integrals over general regions.			√				√			
5	Applications of double integrals.			√				√		√	√
6	Triple integrals (Part I).			√				√			
7	Triple integrals in cylindrical and spherical coordinates.			√				√			√
8	Applications of triple integrals			√				√		√	
9	Line integrals.			√				√			
10	Green's theorem			√				√		√	
11	Applications of Matrices				√				√		
12	Eigen values and Eigen vectors				√				√		√

9. Assessment Methods / ILO Matrix

Assessment	a1	a2	a3	a4	b1	b2	b3	b4	c1	d1
Online Assignments	√	√	√	√	√	√	√	√	√	√
Online Quizzes	√	√	√	√	√	√	√	√		
Written Mid-Term	√	√			√	√				
Written Final Exam	√	√	√	√	√	√	√	√	√	

10. Learning Method / ILO Matrix

Learning Method	a1	a2	a3	a4	b1	b2	b3	b4	c1	d1
On Campus Lectures	√	√	√	√	√	√	√	√	√	
Online Tutorials	√	√	√	√	√	√	√	√		√
Self learning						√			√	

Course Specification

1. Basic Information

PHM021	Vibrations and Waves	3 CH
Prerequisites	Egyptian High School Diploma (Thanaweya Amma) or an International General Certificate of Secondary Education (IGCSE) or Passing Math Placement Test or Basic Mathematics, English Placement Test or English Course.	

Number of weekly Contact Hours		
Lecture	Tutorial	Laboratory
3	1	1

Required SWL	125	Equivalent ECTS	5

Course Content
Review of basic physical mechanics: Work, Kinetic energy, Potential energy, Conservation of energy, Conservative and non-conservative forces, Potential gradient and Power. Vibrations: Uniform circular motion, Simple harmonic motion, energy of a simple harmonic oscillator, Superposition of harmonic vibrations, Damped vibration, Forced vibration and resonance. Wave motion: Wave equation, Transverse and Longitudinal waves, velocity of sound waves, Intensity of sound waves and intensity levels, Standing waves, Interference and Diffraction of light.

Used in Program / Level	
Program Name or requirement	Study Level
Faculty Requirement	0

Assessment Criteria			
Student Activities	Mid-Term Exam	Practical Exam	Final Exam
10%	15%	15%	60%
Exam Duration [Hours]	1		3

Equivalent to other course in another university	
University	
Course code and title	

2. Course Aims

The aim of this course is to provide students with:

- The basic knowledge of different type of oscillations and waves and there real- life applications.
- The fundamentals of physical optics including interference and Fraunhofer diffraction.

3. Program Competencies Served by Course.

A: Faculty Requirements (A1, A2, A8)

- **A1**: Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics.
- **A2**: Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.
- **A8:** Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.

4. Learning Outcomes (LOs)

Cognitive Domain	
1	Recognize the difference between conservative and non-conservative forces, work and energy, circular and simple harmonic motions, damped and forced oscillations, wave motion, waves types, wave speed.
2	Apply proper mathematical models for the different physical phenomena in oscillatory and wave motions.
3	Explain the physical optical phenomena like interference and diffraction patterns in different arrangements.
Psychomotor Domaine	
4	Conduct and interpret accurate measurements on experimental setups.
	N/A
	N/A
Affective Domaine	
5	Cooperate in group activities (teamwork)
6	Display a professional commitment to ethical practice on a daily basis.
	N/A

5. Course LOs Mapping with Level of Competencies

LOs	Competences		
	A1	**A2**	**A8**
Cognitive Domain			
1	●		
2	●		●
3	●		
Psychomotor Domaine			
4		●	●
Affective Domaine			
5		●	●
6			●

6. Assessment and Feedback Strategy

- Formative Assessment Methods:
  - Pop Quizzes
- Summative Assessment Methods:
  - Online Assignments
  - Online Quizzes
  - Practical Exam
  - Mid-Term Exam.
  - Final Exam.

7. Teaching and Learning Methods

- Interactive Online Lectures
- Online Tutorial
- Self-Learning
- Practical Experiments

8. List of References

1. H. J. Pain, “The Physics of Vibrations and Waves”, 6^{th} Edition, John Wiley & Sons, 2005. (EKB-ISBN: 978-0470012963
2. George C. King, “Vibrations and Waves”, Wiley, 2009
3. H. J. Pain and P. Rankin, “Introduction to Vibrations and Waves”, John Wiley & Sons, 2015
4. R. Serway and J. W. Jewett, “Physics for Scientists and Engineers with Modern Physics”, 9^{th} Edition, Brooks Cole, 2014.

9. Study Plan

Week	Course Content	Lecture Hours	Tutorial Hours	Laboratory Hours	Total Hours
1	Revision of physical mechanics.	3	1	1	5
2	Conservative and non-conservative forces, Potential energy and potential gradient.	3	1	1	5
3	Uniform circular motion and Simple harmonic oscillation.	3	1	1	5
4	The energy perspective of the simple harmonic oscillation.	3	1	1	5
5	Superposition of harmonic vibrations	3	1	1	5
6	Damped oscillations.	3	1	1	5
7	Forced oscillations and the concept of resonance.	3	1	1	5
8	The concept of wave propagation and classification of wave types.	3	1	1	5
9	The wave equation and the corresponding parameters.	3	1	1	5
10	Transverse and Longitudinal waves, velocity of sound waves.	3	1	1	5
11	Intensity of sound waves and intensity levels.	3	1	1	5
12	Standing waves.	3	1	1	5
13	Beats, phase and group velocities.	3	1	1	5
14	Interference.	3	1	1	5
15	Diffraction.	3	1	1	5
Total Number of Hours		45	15	15	75

Week	Title of Experiment	Laboratory Hours
1	Introduction to Physics Lab and Measuring Instruments	1
2	Introduction to Physics Lab and Measuring Instruments	1
3	Newton’s Rings Experiment / part (a)	1
4	Newton’s Rings Experiment / part (b)	1
5	Diffraction Grating/ part (a)	1
6	Diffraction Grating / part (b)	1
7	Melde's Experiment / part (a)	1
8	Melde's Experiment / part (b)	1
9	Superposition using Oscilloscope / part (a)	1
10	Superposition using Oscilloscope / part (b)	1
11	Forced Oscillations / part (a)	1
12	Forced Oscillations / part (b)	1
13	General Revision	1
14	Practical and Oral Exam	1
15	Practical and Oral Exam	1
Total Number of Hours		15

10. Course Content / LOs Matrix

Wk	Course Content	1	2	3	4	5	6
1	Revision of physical mechanics.	●					
2	Conservative and non-conservative forces, Potential energy and potential gradient.	●					
3	Uniform circular motion and Simple harmonic oscillation.	●	●		●	●	●
4	The energy perspective of the simple harmonic oscillation.		●				
5	Superposition of harmonic vibrations		●		●	●	●
6	Damped oscillations.	●	●				
7	Forced oscillations and the concept of resonance.	●	●		●	●	●
8	The concept of wave propagation and classification of wave types.	●					
9	The wave equation and the corresponding parameters.		●				
10	Transverse and Longitudinal waves, velocity of sound waves.	●					
11	Intensity of sound waves and intensity levels.	●	●				●
12	Standing waves.	●	●		●	●	●
13	Beats, phase and group velocities.	●	●		●	●	●
14	Interference.	●		●	●	●	●
15	Diffraction.	●	●	●	●	●	●

11. Assessment Methods / LOs Matrix

Assessment	1	2	3	4	5	6
Online Assignments		●				●
Online Quizzes	●	●				●
Mid-Term Exam	●	●	●			
Practical Exam				●		
Final Exam	●	●	●			

12. Learning Method / LOs Matrix

Learning Method	1	2	3	4	5	6
Online Interactive Lectures	●	●	●			
Online Tutorial	●	●	●			
Self-Learning					●	
Practical Experiments				●	●	●

Course Specification

1. Basic Information

<table>
<tr><td colspan="3">PHM022s</td><td colspan="7">Electricity and Magnetism</td><td colspan="2">3 CH</td></tr>
<tr><td colspan="3">Prerequisites</td><td colspan="9"></td></tr>
<tr><td colspan="12">Number of weekly Contact Hours</td></tr>
<tr><td colspan="4">Lecture</td><td colspan="4">Tutorial</td><td colspan="4">Laboratory</td></tr>
<tr><td colspan="4">3</td><td colspan="4">1</td><td colspan="4">1</td></tr>
<tr><td colspan="3">Required SWL</td><td colspan="3">125</td><td colspan="3">Equivalent ECTS</td><td colspan="3">5</td></tr>
<tr><td colspan="12">Course Content</td></tr>
<tr><td colspan="12">Electricity: Vectors, Electric Force, Electric field, Electric potential, Capacitors and dielectrics, DC circuits, Ohm's Law, Kirchhoff's laws. Electromagnetism: Magnetic field, Magnetic force, Sources of Magnetic fields, Ampere's law, Electromagnetic induction, Magnetic properties of materials, AC circuits</td></tr>
<tr><td colspan="12">Used in Program / Level</td></tr>
<tr><td colspan="8">Program Name or requirement</td><td colspan="4">Study Level</td></tr>
<tr><td colspan="8">Faculty Requirement</td><td colspan="4">0</td></tr>
<tr><td colspan="12">Assessment Criteria</td></tr>
<tr><td colspan="3">Student Activities</td><td colspan="3">Mid-Term Exam</td><td colspan="3">Practical Exam</td><td colspan="3">Final Exam</td></tr>
<tr><td colspan="3">15%</td><td colspan="3">15%</td><td colspan="3">10%</td><td colspan="3">60%</td></tr>
<tr><td colspan="3">Exam Duration [Hours]</td><td colspan="3">1</td><td colspan="3"></td><td colspan="3">3</td></tr>
<tr><td colspan="12">Equivalent to other course in another university</td></tr>
<tr><td colspan="3">University</td><td colspan="9"></td></tr>
<tr><td colspan="3">Course code and title</td><td colspan="9"></td></tr>
</table>

2. Course Aims

The aim of this course is to provide students with:

- Work effectively and safely in laboratory environment.
- Use the power of computers in applications of physics.
- Communicate effectively, both orally and in writing.
- Think critically and analyze physical problems.
- Know and understand some of the physical meaning and the governing laws.
- Analyze and solve problems based on understanding of Physical concepts and laws.
- Know some engineering applications based on the studied physical concepts.
- Use the scientific process that scientists use to deduce physical laws.
- Appreciate the power of Science in understanding, developing and sustaining life.

3. Program Competencies Served by Course.

A: Faculty Requirements (A1, A2, A8)

- **A1**: Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics.
- **A2**: Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.
- **A8:** Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.

4. Learning Outcomes (LOs)

Cognitive Domain	
1	Recognize the difference between electric field and electric potential and their importance in study of capacitors, their connections and RC circuits.
2	Explain the magnetic fields, magnetic sources and electromagnetic induction
3	Define the different types of AC circuits and magnetic materials.
Psychomotor Domaine	
4	Apply Physical laws experimentally and use them to solve engineering problems.
Affective Domaine	
5	Cooperate in group activities (teamwork)
6	Display a professional commitment to ethical practice.
	N/A

5. LOs Mapping with Level of Competencies

LOs	Competences		
	A1	**A2**	**A8**
Cognitive Domain			
1	●		
2	●	●	
3	●		
Psychomotor Domaine			
4		●	●
Affective Domaine			
5		●	●
6			●

6. Assessment and Feedback Strategy

- Formative Assessment Methods:
  - Pop Quizzes (written)
- Summative Assessment Methods:
  - Quizzes (on-line)
  - Practical and Oral Exam (interactive)
  - Mid-Term (written)
  - Final Exam (written).

7. Teaching and Learning Methods

- Interactive Lectures (on-line)
- Interactive Tutorial (on-line)
- Self-Learning
- Practical (interactive)

8. List of References

1. R. Serway and J. W. Jewett, "Physics for Scientists and Engineers with Modern Physics", 9th Edition, Brooks Cole, 2014.
2. Halliday, D., Resnick, R., & Walker, J. (2010). Fundamentals of Physics. John Wiley & Sons.

Course Coordinator: **Dr. Mona El Sabbagh**

9. Study Plan

Week	Course Content	Lecture Hours	Tutorial Hours	Laboratory Hours	Total
1	Introduction and Vectors	3	1	1	5
2	Electric force & Electric field	3	1	1	5
3	Electric Flux	3	1	1	5
4	Gauss's Law	3	1	1	5
5	Applications of Gauss's Law	3	1	1	5
6	Electric potential	3	1	1	5
7	Capacitors and dielectrics.	3	1	1	5
8	Current, Resistance and RC Circuits	3	1	1	5
9	Magnetic force.	3	1	1	5
10	Biot-Savart Law	3	1	1	5
11	Ampere's Law	3	1	1	5
12	Faraday-Lenz law	3	1	1	5
13	Self and Mutual Inductance	3	1	1	5
14	Magnetic materials and Magnetic Circuits	3	1	1	5
15	AC circuits	3	1	1	5
Total Number of Hours		45	15	15	75

Week	Title of Experiment	Laboratory Hours
1	Introduction to Lab Instruction and Safety rules	1
2	Determination of the time constant of an RC circuit. Part I	1
3	Determination of the time constant of an RC circuit. Part II	1
4	Determination of unknown capacitance and inductance using phasor diagrams and A.C circuits: Part I	1
5	Determination of unknown capacitance and inductance using phasor diagrams and A.C circuits: Part II	1
6	Determination of unknown capacitance and inductance using phasor diagrams and A.C circuits: Part III	1
7	Temperature Coefficient of Resistance Part I	1
8	Temperature Coefficient of Resistance Part II	1
9	Ampere's law Part I	1
10	Ampere's law Part II	1
11	Biot-Savart's law Part I	1
12	Biot-Savart's law Part II	1
13	General Revision	1
14	General Revision	1
15	Lab Exam	1
Total Number of Hours		15

Course Coordinator: **Dr. Mona El Sabbagh**

10. Course Content / LO Matrix

Wk	Course Content	1	2	3	4	5	6
1	Introduction and Vectors	●					
2	Electric force & Electric field	●					
3	Electric Flux	●					
4	Gauss's Law	●					
5	Applications of Gauss's Law	●					
6	Electric potential	●					
7	Capacitors and dielectrics.	●					
8	Current, Resistance and RC Circuits	●			●	●	●
9	Magnetic force.		●				
10	Biot-Savart Law		●				●
11	Ampere's Law		●				
12	Faraday-Lenz law		●	●	●		
13	Self and Mutual Inductance		●				
14	Magnetic materials and Magnetic Circuits			●	●	●	
15	AC circuits			●	●	●	●

11. Assessment Methods / LO Matrix

Assessment	1	2	3	4	5	6
Assignments	●	●	●			
Quizzes	●	●	●			
Mid-Term Exam	●	●	●			
Practical Exam				●	●	●
Final Exam	●	●	●	●	●	●

12. Learning Method / LO Matrix

Learning Method	1	2	3	4	5	6
Interactive Lectures	●	●	●	●		
Tutorial	●	●	●	●	●	●
Self-Learning					●	●
Practical			●	●	●	●

Course Specification

1. Basic Information

PHM_ 031s	(Statics)		3 CH
Prerequisites	None		
Number of weekly Contact Hours			
Lecture	Tutorial		Laboratory
2	2		1
Required SWL	125	Equivalent ECTS	5
Course Content			
Fundamentals of statics,Force vectors, Equilibrium of a particle, Moments and couples,Resultant of systems of s forces, Types of supports, Free Body Diagram (FBD), Equilibrium of a rigid body, Frames, Trusses and Machines, Internal forced (Normal and Shear forces and bending moment), Friction and its applications, Belt friction, Center of mass, Center of gravity for a single and composite bodies, Moment of inertia and product moment of inertia.			
Used in Program / Level			
Program Name or requirement		Study Level	
Physics and mathematics Dept.		0	
Assessment Criteria			
Student Activities	Mid-Term Exam	Practical	Final Exam
5%	25%	10%	60%
Exam Duration [Hours]	1		3
Equivalent to other course in another university			
University	N/A		
Course code and title	N/A		

Version: 180730

2. CourseAims

By the end of the course the students will be able to:

- Learn how to represent the forces in vector form and how to resolve and add these forces for studying its resultant.
- Study the concept of the moment of a force and moment of a couple.
- Recognize and analyze the free body diagram and the equilibrium of particles, rigid bodies and structures such as frames and trusses.
- Study the concepts of friction and its effect on equilibrium.
- Study the concepts of center of gravity, moment of inertia and virtual work.

3. Intended Learning Outcomes (ILOs)

a.	Knowledge and understanding
a1	Identify Forces, Moments, and Rectangular components of a force in space, Equilibrium of a particle in space and Vector product of two vectors.
a2	Define the Equivalent systems of forces, Free body diagram, Equilibrium of a rigid body.
a3	Identify the Analysis of structures, Forces in beams, Shear and bending moment diagrams.
a4	Define the laws of dry friction, Belt friction.
a5	Locate the center of mass for composite bodies and Distributed forces.
a6	Identify moment of inertiaand its applications.
b.	Intellectual skills
b1	Discriminate between different types of equilibrium conditions.
b2	Formulate the equations of equilibrium of an object.
b3	Analyze the equilibrium problems using different principles.
c.	Professional and practice skills
c1	Design and perform experiments for equilibrium studies.
c2	Perform the functional rule of structural parts inthe equilibrium of structures.
d.	General and transferable skills
d1	Work effectively in a team.
d2	Develop the skills related to creative thinking, problem solverand teamwork.

4. Assessment and Feedback Strategy

- Formative Assessment Methods:
  - Pop Quizzes
- Summative Assessment Methods:
  - Online Assignments
  - Online Quizzes
  - Practical and Oral Exam
  - Mid-Term
  - Final Exam.

5. Teaching and Learning Methods

- Online Interactive Lecture
- Online Tutorial
- Case studies
- Self-Learning
- Practical

6. List of References

Hibbeler R.., " Engineering Mechanics: Statics ", 13th Edition, 2013.

Riley W. and Sturges L., " Engineering Mechanics: Statics".

Beer F., Johnston R. and ClaysenW., "Vector Mechanics for Engineering", McGrawHill, 7th Edition, 2005.

7. ILOs Mapping with Level of Competencies

- A: General standard (A2, A3, A5, A8)
  - **A2**: Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.

  - **A3:** Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.

  - **A5:** Practice research techniques and methods of investigation as an inherent part of learning.

  - **A8:** Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.

ILOs	A1	A2	A5	A8
a1	√	√		
a2	√			
a3	√		√	
a4	√	√		
a5	√			
a6	√	√		
b1	√	√		
b2	√	√	√	
b3	√			
c1	√	√		√
c2				√
d1				√
d2				

8. Study Plan

Week no	Course Content	Lecture	Tutorial	Total
1	Forces and moments vectors.	2	2	4
2	Equilibrium of a particle in plane and in space.	2	2	4
3	Rigid bodies: Equivalent systems of forces.	2	2	4
4	Free body diagram, Reaction at supports, Equilibrium of a rigid body in two dimensions.	2	2	4
5	Reaction at supports, Equilibrium of a rigid body in three dimensions.	2	2	4
6	Structural Analysis “frames and machines”.	2	2	4
7	Structural Analysis “frames and machines”.	2	2	4
8	Structural Analysis “Trusses”.	2	2	4
9	Structural Analysis “Trusses”.	2	2	4
10	Internal forces	2	2	4
11	Dry friction.	2	2	4
12	Center of gravity.	2	2	4
13	Center of gravity.	2	2	4
14	Moment of inertia.	2	2	4
15	Moment of inertia.	2	2	4
Total Number of Hours		30	30	60

Week	Title of Experiment	Laboratory Hours
1	Introduction to mechanics Lab	1
2	Introduction to Measuring Instruments	1
3	Determination of the gravitational acceleration	1
4	Determination of the gravitational acceleration (Repeat)	1
5	Determination of a spring stiffness	1
6	Determination of a spring stiffness (Repeat)	1
7	Force analysis (Equilibrium of a of a particle)	1
8	Force analysis (Equilibrium of a of a particle) (Repeat)	1
9	Friction on a leveled plane	1
10	Friction on a leveled plane (Repeat)	1
11	Friction on an inclined plane	1
12	Friction on an inclined plane (Repeat)	1
13	Center of gravity	1
14	Center of gravity (Repeat)	1
15	General Revision	1
Total Number of Hours		15

9. Online Activities

1. The online activities in this semester include all lectures and tutorials by using Microsoft teams and the meetings with the students have been recorded and uploaded to LMS
2. Also all of the experiments of the lab. Part have been recorded as video show and also uploaded to the students
3. The Quizzes and the midterm exam were held online
4. LMS Link

https://lms.eng.asu.edu.eg/course/view.php?id=6384

5. Microsoft teams link https://teams.microsoft.com/_?culture=en-us&country=US&lm=deeplink&lmsrc=homePageWeb&cmpid=WebSignIn#/school/conversations/General?threadId=19:3786c56de33a49cba58bddc522a396f8@thread.tacv2&ctx=channel

10. Course Content / ILO Matrix

wk.	Course Content	a1	a2	a3	a4	a5	a6	b1	b2	b3	c1	c2	d1	d2
1	Forces and moments vectors.	√		√				√	√		√		√	√
2	Equilibrium of a particle in plane and in space.	√		√				√	√		√		√	√
3	Rigid bodies: Equivalent systems of forces.		√	√				√	√		√		√	√
4	Free body diagram, Reaction at supports, Equilibrium of a rigid body in two dimensions.		√	√				√	√		√		√	√
5	Reaction at supports, Equilibrium of a rigid body in three dimensions.		√	√				√	√		√		√	√
6	Structural Analysis "frames and machines".		√	√				√	√	√		√	√	√
7	Structural Analysis "frames and machines".		√	√				√	√	√		√	√	√
8	Structural Analysis "Trusses".		√	√				√	√	√		√	√	√
9	Structural Analysis "Trusses".		√	√				√	√	√		√	√	√
10	Internal forces			√					√			√	√	√
11	Internal forces diagrams.			√					√			√	√	√
12	Dry friction.			√	√	√			√		√		√	√
13	Center of gravity.			√		√			√		√		√	√
14	Center of gravity.			√		√			√		√		√	√
14	Moment of inertia.			√		√	√		√		√		√	√

11. Assessment Methods / ILO Matrix

Assessment	a1	a2	a3	a4	a5	a6	b1	b2	b3	c1	c2	d1	d2
Assignments	√	√	√	√	√	√	√	√	√	√	√	√	√
Quizzes	√			√	√	√	√	√	√		√		
Practical and Oral Exam	√			√	√	√	√	√	√	√	√		
Mid-Term	√	√	√				√	√	√		√		
Final Exam	√	√	√	√	√	√	√	√	√		√		

12. Learning Method / ILO Matrix

Learning Method	a1	a2	a3	a4	a5	a6	b1	b2	b3	c1	c2	d1	d2
Interactive Lecture	√	√	√	√	√	√	√	√	√	√	√	√	√
Tutorial	√	√	√	√	√	√	√	√	√	√	√	√	√
Case studies	√		√		√		√	√		√		√	√
Self-Learning	√	√		√		√			√		√		
Practical	√	√	√	√	√	√	√	√	√	√	√	√	√

Course Specification

1. Basic Information

PHM 032s	Dynamics			3 CH
Prerequisites	Statics			
Number of weekly Contact Hours				
Lecture	Tutorial		Laboratory	
2	2		1	
Required SWL	125	Equivalent ECTS	5	
Course Content				
Kinematics of particles, linear motion, Motion in resistive media, Study of curvilinear motion using: Cartesian coordinates, Cylindrical coordinates and Intrinsic coordinates, Relative motion, Kinetics of motion with applications on projectiles and harmonic, Work and energy, Applications on conservative and non conservative fields of forces, Impulse and impact, Newton's empirical formula, Impact of particle with fixed pane, Impact of two small balls, Introduction to vibration mechanics.				
Used in Program / Level				
Program Name or requirement			Study Level	
Physics and mathematics Dept.			0	
Assessment Criteria				
Student Activities	Mid-Term Exam	Practical Exam	Final Exam	
5%	25%	10%	60%	
Exam Duration [Hours]	1.5		3	
Equivalent to other course in another university				
University	n/a			
Course code and title	n/a			

2. Course Aims

By the end of the course the students will be able to:

- Recognize the fundamental quantities for describing the kinematics of motion of the particle.
- Study the concept of kinetics which relating the forces and accelerations.
- Perform the analysis of force-acceleration principle for various types of problems that containing particles or rigid bodies.
- Recognize the definition of important fundamental quantities in the field of Dynamics such as work; energy; impulse and momentum.
- Analyze the motion of particles using alternative principles of kinetics such as the work-energy principle and the impulse-momentum principle.

3. Program Competencies Served by Course.

A: Faculty Requirements (A1, A2, A8)

- **A1**: Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics.
- **A2**: Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.
- **A8:** Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.

Cognitive Domain	
1	Recognize the difference between kinematics and kinetics of a particle and the different methods of kinetics as Force and acceleration method, work and Energy method and finally the Impulse and Momentum method
2	Apply the equations used to describe the motion of a particle and the equations of motion of the moving objects
3	Explain the physical meaning of the conservative and non-conservative fields
Psychomotor Domaine	
4	Conduct and interpret accurate measurements on experimental setups.
Affective Domaine	
5	Cooperate in group activities (teamwork)
6	Display a professional commitment to ethical practice on a daily basis.

4. Course LOs Mapping with Level of Competencies

Los	Competences		
	A1	**A2**	**A8**
Cognitive Domain			
1	●		
2	●		●
3	●		
Psychomotor Domaine			
4		●	●
Affective Domaine			
5		●	●
6			●

5. Assessment and Feedback Strategy

- Formative Assessment Methods:
  - Pop Quizzes
- Summative Assessment Methods:
  - Written Assignments
  - Online Quizzes
  - Practical and Oral Exam
  - Written Mid-Term
  - Written Final Exam.

6. Teaching and Learning Methods

- Online Interactive Lecture
- Online Tutorial
- Case studies
- Self-Learning
- Practical exam

7. List of References

Hibbeler R.., " Engineering Mechanics: Dynamics ", 14th Edition, 2016.
Riley W. and Sturges L.., " Engineering Mechanics: Dynamics ".
Beer F., Johnston R. and Claysen W., "Vector Mechanics for Engineering ", McGrawHill, 11th Edition, 2016.

8. Study Plan

Week	Course Content	Lecture	Tutorial	Total
1	Kinematics of particles	2	2	4
2	linear motion, Motion in resistive media	2	2	4
3	curvilinear motion using: Cartesian coordinates	2	2	4
4	Projectiles Motion	2	2	4
5	Cylindrical coordinates and Intrinsic coordinates	2	2	4
6	Relative motion	2	2	4
7	Kinetics of motion with applications	2	2	4
8	Newton’s Second law	2	2	4
9	Work and Energy	2	2	4
10	conservative and non-conservative fields of forces	2	2	4
11	Impulse and impact	2	2	4
12	Newton’s empirical formula	2	2	4
13	Impact of particle with fixed plane	2	2	4
14	Impact of two small balls	2	2	4
15	Impact of two small balls	2	2	4
Total Number of Hours		30	30	60

Week	Experiment	Laboratory
1	Introduction to Dynamics Experiments	1
2	The Gravity Acceleration Exp	1
3	The Gravity Acceleration Exp	1
4	Verification of Newton's Law Exp.	1
5	Verification of Newton's Law Exp.	1
6	X, t Exp.	1
7	X, t Exp.	1
8	Average and Inst. Velocity Part(3)	1
9	Average and Inst. Velocity Part(3)	1
10	Average Acceleration Exp.	1
11	Average Acceleration Exp.	1
12	Projectiles Velocity Exp.	1
13	Projectiles Velocity Exp.	1
14	Trajectory graph and maximum height	1
15	Trajectory graph and maximum height	1
	Total number of hours	15

9. Course Content / LOs Matrix

Week	Course Content	1	2	3	4	5	6
1	Kinematics of particles	●					
2	linear motion, Motion in resistive media	●					
3	curvilinear motion using: Cartesian coordinates	●	●		●	●	●
4	Projectiles Motion		●				
5	Cylindrical coordinates and Intrinsic coordinates		●		●	●	●
6	Relative motion	●	●				
7	Kinetics of motion with applications	●	●		●	●	●
8	Newton's Second law	●					
9	Work and Energy		●				
10	conservative and non- conservative fields of forces	●					
11	Impulse and impact	●	●				●
12	Newton's empirical formula	●	●		●	●	●
13	Impact of particle with fixed plane	●	●		●	●	●
14	Impact of two small balls	●		●	●	●	●
15	Impact of two small balls	●	●	●	●	●	●

10. Assessment Methods / LOs Matrix

Assessment	1	2	3	4	5	6
Online Assignments		●				●
Online Quizzes	●	●				●
Mid-Term Exam	●	●	●			
Practical Exam				●		
Final Exam	●	●	●			

11. Learning Method / LOs Matrix

Learning Method	1	2	3	4	5	6
Online Interactive Lectures	●	●	●			
Online Tutorial	●	●	●			
Self-Learning					●	
Practical Experiments				●	●	●

Course Specification

1- Basic Information

<table>
<tr><td colspan="3">PHM041</td><td colspan="7">Engineering Chemistry</td><td colspan="2">3 CH</td></tr>
<tr><td colspan="3">Prerequisites</td><td colspan="9"></td></tr>
<tr><td colspan="12">Number of weekly Contact Hours</td></tr>
<tr><td colspan="4">Lecture</td><td colspan="4">Tutorial</td><td colspan="4">Laboratory</td></tr>
<tr><td colspan="4">2</td><td colspan="4">1</td><td colspan="4">2</td></tr>
<tr><td colspan="3">Required SWL</td><td colspan="3">125</td><td colspan="3">Equivalent ECTS</td><td colspan="3">5</td></tr>
<tr><td colspan="12">Course Content</td></tr>
<tr><td colspan="12">According to Bylaw 2018:
Physical chemistry: Gases, Liquids, Solids. Thermochemistry, Thermodynamics, Solutions, Ionic equilibrium, and Electrochemistry.
Applied chemistry: Corrosion of metals, Alloys, Water chemistry and its treatment, Chemistry of cements, Chemistry of polymers, Fuels and Combustion, Environmental pollution and its control.</td></tr>
<tr><td colspan="12">Used in Program / Level</td></tr>
<tr><td colspan="8">Program Name or requirement</td><td colspan="4">Study Level</td></tr>
<tr><td colspan="8">Faculty Requirement</td><td colspan="4">0</td></tr>
<tr><td colspan="12">Assessment Criteria</td></tr>
<tr><td colspan="3">Student Activities</td><td colspan="3">Mid-Term Exam</td><td colspan="3">Practical Exam</td><td colspan="3">Final Exam</td></tr>
<tr><td colspan="3">20%</td><td colspan="3">25%</td><td colspan="3">15%</td><td colspan="3">40%</td></tr>
<tr><td colspan="3">Exam Duration [Hours]</td><td colspan="3">2 H</td><td colspan="3">1.5 H</td><td colspan="3">3 H</td></tr>
<tr><td colspan="12">Equivalent to other course in another university</td></tr>
<tr><td colspan="6">University</td><td colspan="6">NA</td></tr>
<tr><td colspan="6">Course code and title</td><td colspan="6">NA</td></tr>
</table>

2- Course Aims

The aim of this course should be:

- To instill in students a sense of enthusiasm for chemistry, an appreciation of its application in different contexts and to involve them in an intellectually stimulating and satisfying experience of learning and studying.
- To provide students with a broad and balanced foundation of chemical knowledge and practical skills.
- To develop in students the ability to apply their chemical knowledge and skills to the solution of theoretical and practical problems in different engineering aspects.
- To develop in students, through an education in chemistry, a range of transferable skills, of value in chemical and non-chemical employment.
- To provide students with a knowledge and skills base from which they can proceed to further studies in specialized areas of chemistry or multi-disciplinary areas.
- To generate in students an appreciation of the importance of chemistry in an industrial, economic, environmental and social context

.

3- Intended learning outcomes of course (ILOs)

Upon successful completion of this course the students will be able to:

a. Knowledge and understanding

a1- Define the main physical and chemical phenomena and terms related to the above-mentioned subjects
a2- Know the general idea about construction of materials and cement chemistry.
a3- Identify the effect of the environment and problems of water pollution

b. Intellectual skills

b1- Examine different solutions for calculation of numerical problems related to the above-mentioned subjects.
b2- Analyze chemical reactions and their characteristics to process industries.

c. Professional and practical skills

c1- Utilize accurate use of different glass wear used for qualitative and quantities chemical analysis.
c2- Analyze the physical properties of petroleum oil analysis using standard equipment.

d. General and transferable skills

d1- Plan working in a team work.
d2- Solve industrial problems in a scientific method

4- A

ssessment and Feedback Strategy

It is essential that the procedures used for the assessment of students' achievement in chemistry should correspond to the knowledge, abilities and skills that are to be developed through their studying.

Evidence, on which the assessment of student achievement is based, should include:

- Formal examinations, including a significant proportion of 'unseen' examinations
- Formative exam
- Laboratory reports
- Problem-solving exercises
- Oral presentations and examinations
- Planning, conduct and reporting of project work.

Additional evidence of use for the assessment of student achievement may be derived from:

- Essay assignments
- Portfolios on chemical activities undertaken
- Literature surveys and evaluations
- Collaborative project work

5- Teaching and learning methods

- **Interactive lectures**
- **Tutorials**
- **Laboratories**
- **Self reading**

Course Grade: There will be no makeup exams or quizzes for any reason other than those sanctioned by the Faculty.

Grading: This average score will be based on the laboratory grade, exams (midterm and final exams), class quizzes, assignments (homework, in-class-activities, etc.), and your activities and participations.

Course grades will be apportioned as shown below:

Laboratory	15%	
Midterm Exam	25%	
Final Exam	40%	
Quizzes (at least TWO)	10%	on line (LMS)
Homework, Assignments	5%	on line (LMS)
Activities	5%	on line (LMS)
Total	**100%**	

6- List of References

Essential books (Text Books)

General Chemistry: Principles and Modern Applications (10th Edition)
10th Edition (2018).
by Ralph H. Petrucci (Author), F. Geoffrey Herring (Author), Jeffry D. Madura (Author), Carey Bissonnette (Author)

Recommended Books

General Chemistry: the essential concepts / Raymond Chang, Williams College, Kenneth A. Goldsby, Florida State University. Chang, Raymond. Seventh Edition, McGraw-Hill, [2014].

7- ILOs Mapping with Level of Competencies

- A: General standard (**A1, A2, A5, A7**)
    - **A1**: Identify, analyze and solve complex engineering problems by applying engineering basic science fundamentals and mathematics.
    - **A2**: Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.
    - **A5:** Practice research techniques and methods of investigation as an inherent part of learning.
    - **A7:** Function efficiently as an individual and as a team member of multi-disciplinary and multi-cultural groups.

ILOs	Level of Competences			
	A1	**A2**	**A5**	**A7**
a. Knowledge and understanding				
a1	●	●		
a2		●	●	
a3				●
b. Intellectual skills				
b1	●	●		
b2		●	●	
c. Professional and practice skills				
c1	●	●		
c2		●		●
d. General and transferable skills				
d1		●		●
d2	●	●		

8- Study Plan

Week	Course Content	Lecture Hours	Tutorial Hours
1	Ideal Gas Law and Real gases	**2**	**1**
2	The critical state of a gas and Work	**2**	**1**
3	Properties of Liquid and Clapeyron equation proof	**2**	**1**
4	Application of Clapeyron Equation and Phase Diagram	**2**	**1**
5	Solid state and Alloys	**2**	**1**
6	Thermo chemistry and 1st law of thermodynamics	**2**	**1**
7	2nd and 3rd laws of thermodynamics	**2**	**1**
8	Solutions – part 1, **Midterm Exam**	**2**	**1**
9	Solutions – part 2	**2**	**1**
10	Electrochemistry	**2**	**1**
11	Corrosion	**2**	**1**
12	Water and its Treatment	**2**	**1**
13	Chemistry of Cement	**2**	**1**
14	Polymers Chemistry	**2**	**1**
15	Fuel Combustion	**2**	**1**
	Total	**30**	**15**

Laboratory work:

The laboratory is a mandatory component of the overall course; you **must** be scheduled for a laboratory section even if you are repeating the course.

• A schedule of laboratory experiments and laboratory exams will be issued by your lab instructor.

• Safety goggles and Gloves must be worn at **ALL** times while in the laboratory.

Attendance Policy: In order to get the most from any course, each student should attend all scheduled classes. If late, please enter the room quietly. If you miss class, get notes from another student ASAP. *If it becomes apparent that you are not attending class (you have missed more than two lectures without discussing with me what is going on with you) then you may be dropped from the course*.

Week	Experiment Title	Laboratory Hours

1	Introduction to Lab Instructions and Safety rules	**2**
2	Introduction to Qualitative Analysis	**2**
3	Identification of simple inorganic salt (Acidic Radical) Part I	**2**
4	Identification of simple inorganic salt (Acidic Radical) Part II	**2**
5	Identification of simple inorganic salt (Basic Radical) Part I	**2**
6	Identification of simple inorganic salt (Basic Radical) Part II	**2**
7	Identification of simple inorganic salt (Acidic and Basic Radical) Part I	**2**
8	Identification of simple inorganic salt (Acidic and Basic Radical) Part II	**2**
9	Introduction to Quantitative Analysis	**2**
10	Determination of conc. of NaOH solution.	**2**
11	Determination of conc. of Alkalinity of water (Part I)	**2**
12	Determination of conc. of Alkalinity of water (Part II)	**2**
13	Determination of conc. of Hardness of water.	**2**
14	Petroleum Experiments – part 1	**2**
15	Petroleum Experiments – part 2, Lab Exam	**2**
	Total	**30**

9- Course Content/ILO Matrix

Course Content	a1	a2	a3	b1	b2	c1	c2	d1	d2
Gases	●			●					
Liquid state and solids	●			●					
Thermo-chemistry + Thermodynamics	●			●	●				
Electrochemistry + Corrosion of metals	●			●	●	●	●	●	●
Water treatment + Chemistry of cements	●	●	●		●	●		●	●
Polymers Chemistry	●	●	●		●				●
Fuels combustion	●				●		●		
The Properties of Solutions	●			●	●	●	●	●	●

10- Assessment Methods /ILO Matrix

Assessment	a1	a2	a3	b1	b2	c1	c2	d1	d2
Assignments	●	●	●	●	●			●	●
Quizzes	●	●	●						
Written exams (mid-term)	●	●	●	●	●				
Chemical analysis Laboratory					●	●	●		
Oral Exams and Presentations	●	●	●				●		●
Written exams (final)	●	●	●	●	●				

11- Learning Method /ILO Matrix

Learning method	a1	a2	a3	b1	b2	c1	c2	d1	d2
Interactive Lectures	●	●	●	●	●				
Tutorials				●	●			●	●
Self Reading	●		●		●				●
Chemical analysis Laboratory					●	●	●	●	●

<u>Course Coordinator:</u>

Assistant Prof. Dr. Mahmoud Salah

Course Specifications

1. Basic Information

PHM111s	**Probability and Statistics**		**2 CH**
Prerequisites	**PHM 013 - Mathematics (2)**		
Number of weekly Contact Hours			
Lecture	Tutorial	Laboratory	
2 H	2 H	0	
Required SWL	100	Equivalent ECTS	4
Course Content			
Review on Probability, Bayes' Theorem, Random Variables (Continuous and Discrete), Probability Distributions, Data Description, Descriptive and Inferential Statistics, Measures of Central Tendency and Dispersion.			
Used in Program / Level			
Program Name or requirement **All Engineering Programs**		Study Level	
Faculty Requirements		**1**	
Assessment Criteria			
Student Activities	Mid-Term Exam	Practical Exam	Final Exam
20 %	**20 %**	**0 %**	**60 %**
Exam Duration [Hours]	**1 H**		**3 H**
Equivalent to other course in another university			
University	NA		
Course code and title	NA		

2. Course Aims

Probability theory and statistics play a great role in many engineering fields. Due to their importance, these topics are addressed in many domains and considered as one of the important courses to be learned in engineering. In this course, the basics of the probability theory, its axioms, common distributions, data description, descriptive and inferential statistics are introduced.

3. Program Competencies Served by Course

A: Faculty Requirements (A3, A8)

A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.

A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.

4. Learning Outcomes (LOs)

Cognitive Domain	
1	Recognize the basic statistical concepts and measures.
2	Describe data using measures of central tendency, variation and position.
3	Illustrate the basic knowledge on fundamental probability concepts, well-known distributions.
Psychomotor Domain	
4	Draw the graphs in statistics to convey the data to the viewers in pictorial form.
	N/A
	N/A
Affective Domain	
5	Verify the role of systematic planning in solving statistics problems.
	N/A
	N/A

5. Course LOs Mapping with Level of Competencies

LOs	Competences	
	A1	**A2**
Cognitive Domain		
1		●
2		●
3	●	
Psychomotor Domaine		
4		●
Affective Domaine		
5		●

6. Assessment and Feedback Strategy

- Formative Assessment Methods:
    - Low-stakes Quizzes
- Summative Assessment Methods:
    - Assignments.
    - Quizzes.
    - Written examinations (midterm & final term)

7. Teaching and Learning Methods

- Interactive Lectures
- Tutorials
- Self-Readings

8. List of References

a. Essential books (text book)

- Allan G. Bluman, " Elementary Statistics: A Step by Step Approach, Seventh Edition", McGraw-Hill, 2012- **ISBN** 978–0–07–353497–8 – **ISBN** 0–07–353497–8

b. Recommended books

- Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, "Probability & Statistics for Engineers & Scientists", Prentice Hall, 2012- **ISBN** 978-0-321-62911-1
- Douglas C. Montgomery, George C. Runger, "Applied Statistics and Probability for Engineers", Wiely, sixth Ed., 2014. (EKB) - **ISBN**: 978-1-118-74412-3.
- Sheldon Ross, "A FIRST COURSE IN PROBABILITY", Prentice Hall, Eighth Ed., 2010.

9. Study Plan

Week	Course Content	Lecture Hours	Tutorial Hours
1	The Nature of Probability and Statistics: Data Collection and Sampling.	**2**	**2**
2	Frequency Distributions and Graphs (1): Organizing Data, Histograms.	**2**	**2**
3	Frequency Distributions and Graphs (2): Graphs.	**2**	**2**
4	Data Description (1): Measures of Central Tendency.	**2**	**2**
5	Data Description (2): Measures of Variation and Position.	**2**	**2**
6	Probability and Counting Rules (1): Sample Spaces and Probability, Addition Rules.	**2**	**2**
7	Probability and Counting Rules (2): Multiplication Rules, Conditional Probability and Counting Rules.	**2**	**2**
8	Discrete Random Variables and Probability Distributions.	**2**	**2**
9	Continuous Random Variables and Probability Distributions.	**2**	**2**
10	Examples of Continuous Probability Distributions	**2**	**2**
11	Joint Probability Distribution.	**2**	**2**
12	Mathematical Expectation, Variance, Covariance and Correlation of two Random Variables.	**2**	**2**
13	Confidence Intervals and Tests of Statistical Hypothesis (I).	**2**	**2**
14	Confidence Intervals and Tests of Statistical Hypothesis (II).	**2**	**2**
15	General Revision	**2**	**2**
Total Number of Hours		**30**	**30**

10. Course Content / LO Matrix

	Course Content	1	2	3	4	5
1	The Nature of Probability and Statistics: Data Collection and Sampling.	√	√			√
2	Frequency Distributions and Graphs (1): Organizing Data, Histograms.	√	√		√	
3	Frequency Distributions and Graphs (2): Graphs.	√	√		√	
4	Data Description (1): Measures of Central Tendency.	√	√		√	
5	Data Description (2): Measures of Variation and Position.	√	√			
6	Probability and Counting Rules (1): Sample Spaces and Probability, Addition Rules.			√		
7	Probability and Counting Rules (2): Multiplication Rules, Conditional Probability and Counting Rules.			√		
8	Discrete Random Variables and Probability Distributions.			√	√	
9	Continuous Random Variables and Probability Distributions.			√	√	
10	Examples of Continuous Probability Distributions			√	√	
11	Joint Probability Distribution.			√		
12	Mathematical Expectation, Variance, Covariance and Correlation of two Random Variables.			√		
13	Confidence Intervals and Tests of Statistical Hypothesis (I).		√	√	√	
14	Confidence Intervals and Tests of Statistical Hypothesis (II).		√	√	√	√
15	General Revision		√	√		√

11. Assessment Methods / LO Matrix

Assessment	1	2	3	4	5
Assignments	√	√	√	√	√
Quizzes	√	√	√	√	
Mid-Term	√	√			
Final Exam	√	√	√	√	

12. Learning Method / LO Matrix

Learning Method	1	2	3	4	5
Interactive Lectures	√	√	√	√	
Tutorial	√	√	√	√	
Self-Reading					√

Course Specification

1. Basic Information

MDP081	Production Engineering		3 CH
Prerequisites			
Number of weekly Contact Hours			

Lecture	Tutorial	Laboratory
2	0	3

Required SWL	125	Equivalent ECTS	5

Course Content
This course aims to provide engineering students with a simple introduction and general knowledge about engineering parts, their materials, and primary production processes and manufacturing technologies. It includes engineering materials classification, characteristics, and materials selection for different applications. Production processes such as casting, joining and metal forming processes. Some manufacturing processes of polymers, machining processes of metals. Machining processes of wood and Measuring instrumentations. In addition, a brief view on new materials (e.g. Nano-materials, metallic glass… etc.) and advanced processing techniques (e.g., CNC, high deformation rate, water jet cutting…. etc.) is provided.

Used in Program / Level	
Program Name or requirement	Study Level
Faculty Requirement	0

Assessment Criteria			
Student Activities	Mid-Term Exam	Practical Exam	Final Exam
25%	15%	10%	50%
Exam Duration [Hours]	1		3

Equivalent to other course in another university	
University	N/A
Course code and title	N/A

Version: 180730

2. Course Aims

The aim of this course is to provide students with:

A simple introduction and general knowledge about engineering parts, their materials, and primary production processes and manufacturing technologies.

3. Intended Learning Outcomes (ILOs)

a.	Knowledge and understanding
a1	Explain the basic requirements for industry.
a2	Identify the different engineering materials
a3	Identify the workshop equipments.
a4	Explain the different manufacturing processes
b.	Intellectual skills
b1	Assign a proper material to a certain product with consideration for environment
b2	Suggest a suitable manufacturing process to produce a certain product.
b3	Evaluate some technological parameter for manufacturing processes
b4	NA
c.	Professional and practice skills
c1	Utilize safety requirement during working with simple tools in the workshop
c2	Differentiate between different materials, tools, machines
c3	Distinguish product defects
c4	NA
d.	General and transferable skills
d1	Apply safety rules and environmental issues
d2	Write a technical report
d3	Work in noisy and dangerous environment
d4	NA

4. Assessment and Feedback Strategy

- Lab reports/project
- Quizzes
- Oral and practical examination for lab activities
- Formative Exam
- Written examinations (midterm & final exam)

5. Teaching and Learning Methods

- Lectures
- Workshop
- Video

6. List of References

- Bruce J. Black,"Workshop Processes, Practices, and Materials" Fourth edition, Elsevier 2010.

- R. Singh, "Introduction to Basic Manufacturing Processes and Workshop Technology" New Age International (P) Limited Publishers, New Delhi 2006.

7. ILOs Mapping with Level of Competencies

ILOs	Level of Competences					
	A3	A4	A8	B1	B3	C4
a. Knowledge and understanding						
a1	√					
a2						
a3						
a4						
b. Intellectual skills						
b1						
b2						
b3	√					
c. Professional and practice skills						
c1		√				
c2						
c3						
d. General and transferable skills						
d1		√				
d2			√			
d3		√				

8. Study Plan

Week	Course Content	Lecture Hours
1	Introduction- materials classification and industrial safety	2
2	Carpentry machines- Types of wood	2
3	Sheet metal work (e.g. deep drawing- piercing) and Rolling process	2
4	Forming Process cont. (e.g. Forging- extrusion- wire drawing---)	2
5	Casting	2
6	Welding	2
7	Polymers types and some manufacturing process	2
8	Hand Processes and Mid-term	2
9	Turning	2
10	Turning	2
11	Drilling	2
12	Shaping	2
13	Milling	2
14	Grinding	2
15	General introduction to advanced manufacturing processes	2
Total Number of Hours		30

Week	Title of Experiment	Laboratory Hours
1	Materials classification and identification	3
2	Carpentry	3
3	Sheet metal work and measurements	3
4	Bulk Forming Processes	3
5	Casting	3
6	Welding	3
7	Polymers processing and quick practical quiz 1	3
8	Hand Processes and Mid-term	3
9	Turning	3
10	Turning	3
11	Drilling and quick practical quiz 2	3
12	Shaping	3
13	Milling	3
14	Grinding m/cs and videos on advanced processes	3
15	Final practical and oral Exam	3
Total Number of Hours		45

9. Course Content / ILO Matrix

Wk	Course Content	a1	a2	a3	a4	b1	b2	b3	c1	c2	c3	d1	d2	d3
1	Introduction- materials classification and industrial safety	√				√								
2	Carpentry machines- Types of wood		√			√			√	√				
3	Sheet metal work and Rolling			√	√	√	√	√		√	√	√	√	√
4	Forming Process cont. (e.g. Forging)			√	√	√	√		√	√	√	√	√	√
5	Casting			√	√		√		√	√	√	√	√	√
6	Welding			√	√		√		√	√	√	√	√	√
7	Polymers types and some manufacturing process		√	√	√		√	√						
8	Hand Processes and Mid-term			√	√		√				√	√	√	√
9	Turning			√	√		√	√			√	√	√	
10	Turning (cont.)			√	√		√	√			√	√		
11	Drilling			√	√		√	√			√	√		
12	Shaping			√	√		√	√			√	√		
13	Milling			√	√		√	√			√	√		
14	Grinding			√	√		√	√						
15	General introduction to advanced manufacturing processes			√	√		√	√						

10. Assessment Methods / ILO Matrix

Assessment	a1	a2	a3	a4	b1	b2	b3	c1	c2	c3	d1	d2	d3
Lab report/project	√		√	√	√	√			√			√	
Quizzes	√	√	√	√	√	√	√						
Mid-Term Exam	√	√	√	√	√	√	√						
Practical/oral Exam								√			√		√
Final Exam	√	√	√	√	√	√	√		√				

11. Learning Method / ILO Matrix

Learning Method	a1	a2	a3	a4	b1	b2	b3	c1	c2	c3	d1	d2	d3
Lectures	√	√	√	√	√	√	√		√	√		√	
Workshop.	√	√	√	√				√	√	√	√		√
Video				√					√				

Course Specification

1. Basic Information

<table>
<tr><td colspan="3">MDP-011</td><td colspan="7">Engineering Drawing</td><td colspan="2">3 CH</td></tr>
<tr><td colspan="3">Prerequisites</td><td colspan="9">NA</td></tr>
<tr><td colspan="12">Number of weekly Contact Hours</td></tr>
<tr><td colspan="4">Lecture</td><td colspan="4">Tutorial</td><td colspan="4">Laboratory</td></tr>
<tr><td colspan="4">1</td><td colspan="4">3</td><td colspan="4">2</td></tr>
<tr><td colspan="3">Required SWL</td><td colspan="3">150</td><td colspan="3">Equivalent ECTS</td><td colspan="3">6</td></tr>
<tr><td colspan="12">Course Content</td></tr>
<tr><td colspan="12">According to Bylaw 2018:

Engineering drawing techniques and skills. Conventional lettering and dimensioning. Geometric constructions. Theories of view derivation. Orthographic projection of engineering bodies. Derivation of views from isometric drawings and vice versa. Derivation of views and sections from given views. Sectioning views: (half, removed, rotates, offset and partial sectioning). Introduction of assembly drawing. Computer aided drafting (CAD).</td></tr>
<tr><td colspan="12">Used in Program / Level</td></tr>
<tr><td colspan="8">Program Name or requirement</td><td colspan="4">Study Level</td></tr>
<tr><td colspan="8">Faculty Requirement</td><td colspan="4">0</td></tr>
<tr><td colspan="12">Assessment Criteria</td></tr>
<tr><td colspan="3">Student Activities</td><td colspan="3">Mid-Term Exam</td><td colspan="3">Practical Exam</td><td colspan="3">Final Exam</td></tr>
<tr><td colspan="3">40%</td><td colspan="3">20%</td><td colspan="3">0%</td><td colspan="3">40%</td></tr>
<tr><td colspan="3">Exam Duration [Hours]</td><td colspan="3">2Hrs</td><td colspan="3"></td><td colspan="3">3Hrs</td></tr>
<tr><td colspan="12">Equivalent to other course in another university</td></tr>
<tr><td colspan="3">University</td><td colspan="9">N/A</td></tr>
<tr><td colspan="3">Course code and title</td><td colspan="9">N/A</td></tr>
</table>

2. Course Aims

The aim of this course is to provide studentsthe ability to:
- Understanding the fundamental of engineering drawing.
- Understanding various technical drawings with necessary views and dimensions.
- Enlarge students, imagination capability in understanding the Engineering and assembly drawings.

The student shall attain the above mentioned objectives efficiently under controlled guidance and supervision while gaining the experience through imagination and drawing any engineering drawings.

3. Intended Learning Outcomes (ILOs)

a.	Knowledge and understanding
a1	Identify the fundamental of engineering drawings.
a2	Define the various technical drawing principles (isometric and necessary views).
a3	Identify the fundamental of assembly drawing
a4	Define the basic commands required when using CAD software
b.	Intellectual skills
b1	Develop the various views of objective parts.
b2	Express the design ideas into engineering drawing.
c.	Professional and practice skills
c1	Create the feasible drawings views of the orthogonal projection.
c2	Enlarge students capability in understanding the engineering drawings
d.	General and transferable skills
d1	Present engineering ethics in course deliverable.
d2	Practice working in team project

4. Assessment and Feedback Strategy

- Formative Assessment Methods:
    - Assignments
    - Quizzes
    - Lab exam
    - Written examinations (midterm & final tem)

- Assessment schedule :

Assessment method	**Description**	**Week No**	**Weight (%)**
Written	In class activities Campus activity every week	Weekly	10
Written	Home activities At home every week	Weekly	10
Written Exam	Mid-term exam	Week 7	20
Quizzes	Planned Quiz	Week 5 and 12	10
Lab work	Lab participation **uploaded at LMS**	Weekly	10
Lab Exam	Lab Exam	Week 15	
Written Exam	Final exam **At campus**	Week 16	40
		Total	100

5. Teaching and Learning Methods

- Lecture- **Schedule lectures at campus** **and** (**Online Schedule lab lectures through Microsoft Teams**)
- Tutorial – (Tutorials At campus every week – and schedule labs at campus) as well as interactive learning and discussion through a group **whatsapp mobile connection and Microsoft Teams**
- Interactive learning Software (CAD)
- Self-learning

6. List of References

6-1 Course notes

Engineering Drawing note book distributed by the instructors and uploaded at LMS

6-2 Essential books (text books)

- K. Rathnam, "A First Course In Engineering Drawing", **EKB**, Springer, 2018.
- H. ORO, "General Engineering Drawing Examples", **EKB**, Macmillan, 2012.
- Peter Astley , "Engineering Drawing and Design II", **EKB**, Macmillan, 1978.
- J. C. Cluley, "Electrical Drawing I", **EKB**, Macmillan, 2014.
- Thomas, E.F., "Fundamentals of Engineering Drawing", McGraw-Hill, 2014
- Thomas, E.F. and Vierck, C.J., "Engineering Drawing and Graphic Technology", McGraw-Hill, 2016
- 4- Hart, K.R., "Engineering Drawing", The English Universities Press Ltd, 2010

7. ILOs Mapping with Level of Competencies

- A: General standard (A1, A2, A5, A7)
  - **A1.** Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.
  - **A2:** Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.
  - **A5:** Practice research techniques and methods of investigation as an inherent part of learning.
  - **A7.** Function efficiently as an individual and as a member of multi-disciplinary and multi-cultural teams.

ILOs	Level of Competences			
	A1	**A2**	**A5**	**A7**
a. Knowledge and understanding				
a1	●			●
a2	●	●		
a3			●	●
a4			●	
b. Intellectual skills				
b1		●		
b2			●	
c. Professional and practice skills				
c1	●			●
c2		●		●
d. General and transferable skills				
d1	●		●	
d2			●	●

8. Study Plan

Week	Course Content	Lecture Hours	Tutorial Hours	Lab Hours	Total
1	Introduction and Geometric constructions	1	3	2	6
2	Theories of view derivation	1	3	2	6
3	Orthographic projection of engineering bodies	1	3	2	6
4	Drawing isometric for plane and curved surfaces	1	3	2	6
5	Derivation of normal surfaces views from isometric	1	3	2	6
6	Derivation of inclined surfaces views from isometric	1	3	2	6
7	Derivation of oblique surfaces views from isometric	1	3	2	6
8	Theory of sectioning	1	3	2	6
9	Derivation of third view from given two views	1	3	2	6
10	Derivation of complete sections from given views	1	3	2	6
11	Derivation of half sections from given views	1	3	2	6
12	Principals of assembly drawing	1	3	2	6
13	Derivation of offset sections from given views	1	3	2	6
14	General applications for projection	1	3	2	6
15	Revision	1	3	2	6
Total Number of Hours		**15**	**45**	**30**	**90**

Week	Title of Experiment [Lab activities]	Lab Hours
1	Introduction: configuration of the program	**2**
2	-**Draw Commands:**Line and Circle.	**2**
3	**Modify Commands:**Erase, Trim, Scale, Fillet, Chamfer, rotate and Stretch	**2**
4	**-Draw Commands, cont :**Rectangle , Polygon and Ellipse **-Modify Commands; cont :**Copy , Move and Mirror	**2**
5	**-advanced drawing Commands:** Hatch - Text **- Advanced modify Commands:**Array and offset	**2**
6	**-Layers:**(Line types, Line colors and Line weight)	**2**
7	**-Plot Command:**Produce standard drawing template including a border, title block and logo.	**2**
8	-Demonstration of the orthographic projection for 3D Isometric.	**2**
9	-Draw the three views to an Isometric	**2**
10	-Draw the three views with sectioning	**2**
11	-Demonstrate the Assembly Drawing and the aim of it.	**2**
12	-Plot orthographic projections of components and assemblies.	**2**
13	Assembly of some mechanical components: Part (1)	**2**
14	Assembly of some mechanical components: Part (2)	**2**
15	Revision	**2**
Total Number of Hours		**30**

9. Course Content / ILO Matrix

Week	Course Content	a1	a2	a3	a4	b1	b2	c1	c2	d1	d2
1	Introduction and Geometric constructions	●							●	●	
2	Theories of view derivation	●	●		●			●		●	
3	Orthographic projection of engineering bodies	●	●		●	●		●	●	●	
4	Drawing isometric for plane and curved surfaces	●	●		●	●		●	●	●	
5	Derivation of normal surfaces views from isometric	●	●		●	●		●	●		●
6	Derivation of inclined surfaces views from isometric	●	●		●	●		●	●	●	●
7	Derivation of oblique surfaces views from isometric	●	●		●	●		●	●	●	●
8	Theory of sectioning	●			●	●		●	●	●	
9	Derivation of third view from given two views	●			●	●		●	●	●	●
10	Derivation of complete sections from given views	●			●	●		●	●	●	●
11	Derivation of half sections from given views				●	●		●			●
12	Principals of assembly drawing	●		●	●	●	●	●	●	●	●
13	Derivation of offset sections from given views			●	●	●		●	●	●	●
14	General applications for projection			●	●	●	●	●	●	●	●

10. Assessment Methods / ILO Matrix

Assessment	a1	a2	a3	a4	b1	b2	c1	c2	d1	d2
Assignments : **Schedule assignments**, corrected and evaluated at campus	●	●	●	●	●	●	●			●
Quizzes: **Schedule quizzes**	●			●	●			●	●	
Lab exam: **lab exam**	●	●	●	●	●		●	●	●	
Mid-Term Exam: **Exam at campus**	●	●			●		●	●	●	
Final Exam: **Written Exam at campus**	●	●			●		●	●	●	

11.Learning Method / ILO Matrix

Learning Method	a1	a2	a3	a4	b1	b2	c1	c2	d1	d2
Interactive Lectures	●	●	●	●	●	●				
Laboratory work	●	●	●	●	●	●	●	●		
Self Readings	●		●	●		●			●	
Problem Solving tutorial				●	●	●	●	●	●	●

12.Marks distribution

<table>
<tr><td rowspan="3">Assignments (30)</td><td>Class work</td><td>10</td></tr>
<tr><td>Home work</td><td>10</td></tr>
<tr><td>Quizzes
Extra work</td><td>10</td></tr>
<tr><td colspan="2">Lab activity</td><td>10</td></tr>
<tr><td colspan="2">Midterm Exam</td><td>20</td></tr>
<tr><td colspan="2">Final Exam</td><td>40</td></tr>
<tr><td colspan="2">Total</td><td>100</td></tr>
</table>

Curse Coordinator: Prof. Hesham Aly ABd Elhameed senbel
Version: 180730

Course Specification

Basic Information

CEP011	Projection and Engineering Graphics	3 CH
Prerequisites	**N.A**	

Number of weekly Contact Hours		
Lecture	**Tutorial**	**Laboratory**
1 H	**3 H**	**2 H**

Required SWL	**150 H**	**Equivalent ECTS**	**6 H**

Course Content

According to Bylaw 2018:

Introduction to descriptive geometry, projection of points, lines, surfaces. Intersection of bodies and surfaces. Development of surfaces. The principles of steel drawing and construction. Derivation of views and sections from given views of steel constructions. Fundamentals of architectural drawing. Home plan, Floor plan, symbols of windows, doors, stairs, ramps, etc. Computer aided drafting (CAD).

Used in Program / Level

Program Name or requirement	**Study Level**
Freshmen	

Assessment Criteria

Assignments & Projects	**Mid-Term Exam**	**Practical Exam**	**Final Exam**
35 %	**15 %**	**10%**	**40 %**
Final Exam Duration	**2 H**	**Collaborative with another institution**	**NA**

1. Course Aims

By the end of this course, the student will be able to:

Communicate by means of engineering drawing and to relate the applications of drawing techniques to engineering practice. They will be able to distinguish between the different types of projections, indicate the dimensions of technical products. They will get a basic idea about how to produce a computer aided drawing (CAD).

2. Intended Learning Outcomes (ILOs)

We will keep the following table (the old ILOs) for now, and we will remove later after approving the updated CS. From now on we will always use the term (LOs) instead of (ILOs)

	a. Knowledge and understanding
a 1	Tell the purpose and theory of multi view projections
a 2	List the procedure to construct Perspective Projections drawings
a 3	Recognize Standard steel sections
a 4	NA
	b. Intellectual skills
b1	Construct different geometric figures
b 2	Investigate the Intersection of bodies and surfaces
b 3	Create Perspective Projections
b 4	Develop the various views of steel connections and building elements
	c. Professional and practice skills
c1	Create a complete drawing considering the neatness and aesthetics of the lines, dimensions and hatching.
c2	N/A
c3	N/A
c4	N/A
	d. General and transferable skills
d 1	Communicate effectively.
d 2	Demonstrate efficient IT capabilities
d3	N/A
d4	N/A

3. Competencies and LOs Mapping

Applicable program competencies for this course (maximum 3 to 4).

- **A0: University requirements**
- **A: General standard [faculty requirements] (A1, A2, etc.)**
- **B: Program specialty (B1, B2, etc.)**
- **C: Program sub-specialty (C1, C2, etc.)**
- **D: Inter-Disciplinary (D1, D2, etc.)**

A8. Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.

A9. Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.

Learning Outcomes - LOs

Cognitive Domain	
1	Identifies different geometric figures
2	Estimates the Intersection of bodies and surfaces
	N/A
Psychomotor Domaine	
3	Develop the various views of geometric figures , steel connections and building elements.
4	Sketches Perspective Projections
	N/A
Affective Domaine	
5	Presents a complete drawing considering the neatness and aesthetics of the lines, dimensions, and hatching.
	N/A
	N/A

Mapping

LOs	Competences	
	A8	**A9**
Cognitive Domain		
1	●	
2	●	●
Psychomotor Domaine		
3	●	
4	●	●
Affective Domaine		
5		●

4. Assessment and Feedback Strategy

- Formative Assessment Methods:
  - Pop Quizzes
  - In-Class Discussion
  - Ask Your Peer
- Summative Assessment Methods:
  - Assignments (online, written)
  - Quizzes (online, written)

- Lab activities.
- Written examinations (midterm & final term)

5. Teaching and Learning Methods

- Lectures (including face to face & distance by using Microsoft Teams plat form)
- Tutorials (including face to face & distance by using Microsoft Teams plat form)
- Practical lab activities on campus

6. List of References

- - K. Venkata Reddy, "Textbook of Engineering Drawing", 2nd Edition, BS Publications, 2008.

7. Study Plan

Week no	Course Content	Lecture	Tutorial	Total
1	Introduction to descriptive geometry	1	3	4
2	Basic processes in engineering drawing	1	3	4
3	projection of points	1	3	4
4	projection of lines	1	3	4
5	projection of surfaces	1	3	4
6	Intersection of bodies and surfaces	1	3	4
7	Development of surfaces	1	3	4
8	Standard steel sections and steel structures	1	3	4
9	Compound steel sections and welds	1	3	4
10	Fundamentals of Building drawing	1	3	4
11	Fundamentals of Building drawing	1	3	4
12	Perspective Projections	1	3	4
13	Perspective Projections	1	3	4
14	Perspective Projections	1	3	4
15	Perspective Projections	1	3	4
	Total	**15**	**45**	**60**

Lab experiments list		
Week no	**Experiments title**	**H**
1	Introduction & AutoCad Main Window	**2**
2	Basic drawing & editing commands	**2**
3	Creating a simple drawing	**2**
4	Making changes in drawing	**2**
5	Organize drawing with layers	**2**
6	Advanced object types	**2**
7	Creating more complex objects	**2**
8	Advanced editing commands	**2**
9	Text	**2**
10	Printing drawings	**2**
11	Inserting blocks	**2**
12	Hatching	**2**
13	Architectural Project 1	**2**
14	Civil Project	**2**
15	Revision	**2**
	Total	**30**

The 3 matrices should be updated.

8. Course Content / LOs Matrix

Wk	Course Content	LO1	LO2	LO3	LO4	LO5
1	Introduction to descriptive geometry	•				
2	Basic processes in engineering drawing	•				
3	projection of points	•				
4	projection of lines	•	•			
5	projection of surfaces	•				
6	Intersection of bodies and surfaces		•			
7	Development of surfaces			•		•
8	Standard steel sections and steel structures					
9	Compound steel sections and welds			•		•
10, 11	Fundamentals of Building drawing			•		•
12 -15	Perspective Projections			•	•	•

9. Assessment and Feedback Strategies / LOs Matrix

Assessment	1	2	3	4	5
Assignments	•	•	•	•	•
Quizzes	•		•		
lab activities			•		•
Mid-Term Exam		•	•		•
Final Exam		•	•	•	•

10. Teaching & Learning Methods / LOs Matrix

Learning Method	1	2	3	4	5
Lectures	•	•	•	•	
Tutorials		•	•	•	•
Practical			•		•

Course Specification

1. Basic Information

<table>
<tr><td>CSE 031</td><td colspan="2">Computing in Engineering</td><td>2 CH</td></tr>
<tr><td>Prerequisites</td><td colspan="3"></td></tr>
<tr><td colspan="4">Number of weekly Contact Hours</td></tr>
<tr><td>Lecture</td><td colspan="2">Tutorial</td><td>Laboratory</td></tr>
<tr><td>2</td><td colspan="2">0</td><td>0</td></tr>
<tr><td>Required SWL</td><td>100</td><td>Equivalent ECTS</td><td>4</td></tr>
<tr><td colspan="4">Course Content</td></tr>
<tr><td colspan="4">This introductory course in emerging technologies lays out the principles of big data, cloud computing, distributed computing, OS, IoT, content delivery network , Network Protocols, Wireless Network protocols , eG/4G/5G, LTE, IPv4, IPv6, Internet operations, processors and storage technologies, Embedded Systems, augmented reality), virtual reality , the impact of technology on society. The course covers also computational thinking, problem solving, Abstraction, Problems Analysis</td></tr>
<tr><td colspan="4">Used in Program / Level</td></tr>
<tr><td colspan="3">Program Name or requirement</td><td>Study Level</td></tr>
<tr><td colspan="3">Faculty Requirements</td><td>0</td></tr>
<tr><td colspan="3"></td><td></td></tr>
<tr><td colspan="3"></td><td></td></tr>
<tr><td colspan="3"></td><td></td></tr>
<tr><td colspan="4">Assessment Criteria</td></tr>
<tr><td>Student Activities</td><td>Mid-Term Exam</td><td>Practical Exam</td><td>Final Exam</td></tr>
<tr><td>15%</td><td>25%</td><td></td><td>60%</td></tr>
<tr><td>Exam Duration [Hours]</td><td>1</td><td></td><td>2</td></tr>
<tr><td colspan="4">Equivalent to other course in another university</td></tr>
<tr><td>University</td><td colspan="3">NA</td></tr>
<tr><td>Course code and title</td><td colspan="3">NA</td></tr>
</table>

2. Course Aims

The aim of this course is to provide students with:

- Basic knowledge of the structure of the computer
- Principles of big data, cloud computing, distributed computing, OS, IoT
- Needed knowledge and skills for computational thinking, problem solving, and Problems Analysis

3. Intended Learning Outcomes (ILOs)

a.	Knowledge and understanding
a1	Identify the components of a computer system and its architecture
a2	Define computer network architecture
a3	Identify advanced computer principles
b.	Intellectual skills
b1	Convert between numbering system
b2	Draw flow charts and write pseudocode
b3	Calculate the file transfer speed through a network
c.	Professional and practice skills
c1	Search the Internet
c2	Use computational thinking for problem solving
d.	General and transferable skills
d1	Write a report
d2	Use the email system
d3	Use digital libraries and/or eLearning systems

4. Assessment and Feedback Strategy

- Assignments (submitted and reviewed via LMS)
- On-Line Exams (Quizzes)
- Written examinations (Quizzes, Midterm, and Final)

5. Teaching and Learning Methods

- On-Line Lectures
- On-Line office hours
- Self-learning

6. List of References

- Course Notes developed by course instructors.
- Discovering Computers 2011, By “Gary B. Shelly, Misty E. Vermaat”,” 2011 Course Technology, Cengage Learning

7. ILOs Mapping with Level of Competencies

ILOs	Level of Competences					
	A2	**A3**	**A5**	**A8**		
a.						
a1				●		
a2		●				
a3		●				
b.						
b1	●					
b2			●			
b3			●			
c.						
c1				●		
c2				●		
d.						
d1			●			
d2			●			
D3			●			

Study Plan

Topic#	Course Content	Lecture Hours
1	The components of a computer system	4
2	Data representation	4
3	Computer networks	4
4	Problem solving using computational techniques	4
5	Relational Database	4
6	Cloud Computing	2
7	Internet of things (IOT)	2
8	Virtual reality	2
9	Big Data	2
Total Number of Hours		28

8. Course Content / ILO Matrix

Topic #	Course Content	a1	a2	a3	b1	b2	b3	c1	c2	d1	d2	d3
1	The components of a computer system	X						x			x	x
2	Data representation			x	X			x		x	x	x
3	Computer networks	x	x				x	x		x	x	x
4	Problem solving using computational techniques					X		x	X	X	x	x
5	Relational Database			x		X		x	X	x	x	x
6	Cloud Computing		x	x				x			x	x
7	Internet of things (IOT)	x	x	x				x			x	x
8	Virtual reality	x		x				x			x	x
9	Big Data			x				x			x	x

9. Assessment Methods / ILO Matrix

Assessment	a1	a2	a3	b1	b2	b3	c1	c2	d1	d2	d3
Assignments	x			x	x		x	x	x	x	x
Quizzes	x			x	x						
Mid-Term Exam	x	x		x	x						
Final Exam	x	x	x	x	x	x					

10. Learning Method / ILO Matrix

Assessment	a1	a2	a3	b1	b2	b3	c1	c2	d1	d2	d3
On-Line lectures	x	x	x	x	x	x	x	x	x	x	x
On-Line office hours	x	x	x	x	x	x	x	x	x	x	x
Self-Learning	x	x	x	x	x	x	x	x	x	x	x

Course Specification

1. Basic Information

MDP 151	Structure and properties of materials	2 CH
Prerequisites	PHM_041 General Chemistry	

Number of weekly Contact Hours 4		
Lecture	Tutorial	Laboratory
2	1	1

Required SWL	100	Equivalent ECTS	4

Course Content

Engineering materials: metals, polymers, ceramics, and composites. The internal structure of material: atomic structure, atomic arrangement, microstructure, and macrostructure. Good exploitation of the material requirements for a set of properties suitable for this use. Material properties: physical, chemical, mechanical, electrical, thermal, and optical properties. Relationship between material properties and its internal structure, method of synthesizing, manufacturing, processing

Used in Program / Level	
Program Name or requirement	Study Level
Design and Production Engineering Program.	Sophomore
Mechanical Power Engineering Program	Sophomore
Automotive Engineering Program	Sophomore
Mechatronics Engineering Program	Sophomore
Materials Engineering program.	Sophomore
Manufacturing Engineering Program.	Sophomore
Mechatronics Engineering and Automation Program	Sophomore
Energy and Renewable Energy Engineering Program.	Sophomore

Assessment Criteria			
Student Activities	Mid-Term Exam	Practical Exam	Final Exam
25%	20%	15%	40%
Exam Duration [Hours]	2		

Equivalent to other course in another university	
University	Faculty requirement
Course code and title	

2. Course Aims

The aim of this course is to provide students with by background necessary to:

- Realize the relation between structure and properties of materials.
- Understand the difference between crystalline and amorphous materials.
- Use microscope to investigate the structure of materials.
- Assess the mechanical and thermal properties of materials.

3. Intended Learning Outcomes (ILOs)

a.	Knowledge and understanding
a1	Classify the different types atomic bonding
a2	List the various types of crystal systems and crystal structures.
a3	Name the various types of phase diagrams.
a4	Define physical and mechanical properties of solid materials
b.	Intellectual skills
b1	Analyze the various crystal structures of Metallic, polymeric and ceramic s materials.
b2	Predict type of phases in Iron Carbon diagram.
b3	Criticize the performance of materials under various kinds phases
b4	Select the appropriate materials for a specific application.
c.	Professional and practice skills
c1	Sketch the microstructure of different alloys
c2	Relate the mechanical and physical properties of solid materials with the microstructure
c3	Measure the grain size of solid materials.
c4	Implement a tensile and hardness tests on solid materials.
d.	General and transferable skills
d1	Effectively manage tasks, time, and resources.
d2	Refer to relevant literature and standard
d3	Develop the creative thinking and problem-solving skills.
d4	Work in a team

4. Assessment and Feedback Strategy

- Assignments
- Quizzes
- Oral examination for lab activities
- Project
- Written examinations (midterm & final term)

5. Teaching and Learning Methods

- Lectures
- Tutorials
- Practical
- Self-learning
- Project based learning

6. List of References

- William D. Callister, Jr. & David G. Rethwisch" Fundamentals of Materials Science and Engineering". An Integrated Approach. John Wiley & Sons, (Asia) Pte. Ltd.2008.
- R.K. Rajupt "Material Science and Engineering" 3rd edition, S.K. Kataria & Sons. 2008.

7. ILOs Mapping with Level of Competencies

1- Materials Engineering Program

ILOs	Level of Competences					
	A2.	A4.	A5.	A6.	D1.	D2.
a. Knowledge and understanding						
a1	•					
a2		•				•
a3					•	•
a4	•		•			•
b. Intellectual skills						
b1				•		•
b2	•	•	•			
b3	•				•	•
b4			•		•	•
c. Professional and practice skills						
c1				•		•
c2					•	•
c3		•	•			
c4		•			•	
d. General and transferable skills						
d1		•		•		
d2			•			•
d3				•	•	
d4			•	•		

2-Mechatronics Engineering and Automation Program

ILOs	Level of Competences					
	A2.	A4.	A5.	A6.	D2.	D3.
a. Knowledge and understanding						
a1	•					
a2		•				•
a3				•		•
a4	•		•			•
b. Intellectual skills						
b1				•		
b2	•	•	•			
b3	•		•			•
b4			•		•	
c. Professional and practice skills						
c1				•	•	
c2						•
c3		•	•		•	•
c4		•			•	
d. General and transferable skills						
d1		•		•		•
d2			•			
d3				•	•	
d4			•	•		

3- Manufacturing Engineering Program

ILOs	Level of Competences					
	A2.	A4.	A5.	A6.	D3.	D8.
a. Knowledge and understanding						
a1	•				•	
a2		•				
a3				•		
a4	•		•			•
b. Intellectual skills						
b1				•		
b2	•	•	•			
b3	•		•			•
b4			•		•	
c. Professional and practice skills						
c1				•		
c2						•
c3		•	•			•
c4		•				•
d. General and transferable skills						
d1		•		•		•
d2			•			
d3				•	•	
d4			•	•		

4- Energy and Renewable Energy Engineering Program

ILOs	Level of Competences					
	A2.	A4.	A5.	A6.	D5.	D6.
a. Knowledge and understanding						
a1	•				•	
a2		•				•
a3				•		
a4	•		•			•
b. Intellectual skills						
b1				•		
b2	•	•	•		•	
b3	•		•			•
b4			•		•	
c. Professional and practice skills						
c1				•		
c2						•
c3		•	•			•
c4		•				•
d. General and transferable skills						
d1		•		•		•
d2			•			
d3				•	•	
d4			•	•		

5-Specialized programs

a- Design and Production Engineering Program

b- Mechanical Power Engineering Program

c- Automotive Engineering Program

d- Mechatronics Engineering Program

ILOs	Level of Competences					
	A2.	A4.	A5.	A6.	B2m.	B4m.
a. Knowledge and understanding						
a1	•				•	
a2		•				•
a3				•	•	•
a4	•		•			•
b. Intellectual skills						
b1				•		
b2	•	•	•		•	
b3			•		•	
b4			•		•	
c. Professional and practice skills						
c1				•		
c2					•	•
c3		•	•		•	•
c4		•				•
d. General and transferable skills						
d1		•		•		•
d2			•			
d3				•	•	
d4			•	•		

8. Study Plan

Week	Course Content	Lecture Hours	Tutorial Hours
1	Classification of materials.	2	-----
2	Atomic bonding.	2	2
3	Crystallinity of materials.	2	2
4	Crystallinity of materials.	2	2
5	Solidification of metals.	2	-----
6	Solidification of metals	2	2
7	Phase diagram	2	------
8	Mid Term	2	-----
9	Phase diagram	2	2
10	Iron carbon diagram	2	2
11	Iron carbon diagram	2	-----
12	Polymers	2	-----
13	Polymers	2	2
14	Ceramics	2	------
15	Mechanical Testing	2	2
Total Number of Hours		**30**	16

Week	Title of Experiment	Laboratory Hours
1	Materials identifications	2
2	------	-----
3	-----	-----
4	-----	-----
5	Sample preparation	2
6	-----	-----
7	Cooling curves	2
8	Mid Term	2
9	-----	-----
10	-----	-----
11	Metallographic and materials designation	2
12	Polymer identification	2
13	-----	-----
14	Mechanical Testing	2
15	----	-----
Total Number of Hours		**14**

9. Course Content / ILO Matrix

Wk	Course Content	a1	a2	a3	a4	b1	b2	b3	b4	c1	c2	c3	c4	d1	d2	d3	d4
1	Classification of materials.	*				*								*			
2	Atomic bonding.	*	*		*	*											
3	Crystallinity of materials.		*			*		*									
4	Crystallinity of materials.		*			*		*									
5	Solidification of metals.		*	*													
6	Solidification of metals			*													
7	Phase diagram				*		*	*		*		*					
8	Mid Term																
9	Phase diagram		*		*		*	*		*	*	*					
10	Iron carbon diagram		*			*	*		*	*	*	*					
11	Iron carbon diagram		*			*	*	*	*	*	*	*				*	
12	Polymers	*				*			*		*					*	
13	Polymers	*				*			*	*			*				
14	Ceramics	*				*			*	*	*		*				
15	Mechanical Testing				*			*	*		*		*	*	*	*	*

10. Assessment Methods / ILO Matrix

Assessment	a1	a2	a3	a4	b1	b2	b3	b4	c1	c2	c3	c4	d1	d2	d3	d4
Assignments	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
Projects													*	*	*	*
Quizzes(week 6,9 and 12)	*	*	*	*	*	*	*	*	*	*	*					
Mid-Term Exam	*	*	*	*	*	*	*		*		*					
Practical Exam						*		*	*	*	*	*		*		
Final Exam	*		*		*	*	*	*	*	*	*	*				

11. Learning Method / ILO Matrix

Learning Method	a1	a2	a3	a4	b1	b2	b3	b4	c1	c2	c3	c4	d1	d2	d3	d4
Lecture	*	*	*	*	*	*	*	*	*	*	*	*				
Tutorial					*	*		*								
Practical							*	*					*		*	*
Self-learning													*	*	*	*
Project									*	*			*			*

Course Specification

1. Basic Information

<table>
<tr><td>MDP231</td><td colspan="3">Engineering Economy</td><td>2 CH</td></tr>
<tr><td>Prerequisites</td><td colspan="4"></td></tr>
<tr><td colspan="5">Number of weekly Contact Hours</td></tr>
<tr><td>Lecture</td><td colspan="2">Tutorial</td><td colspan="2">Laboratory</td></tr>
<tr><td>2</td><td colspan="2">1</td><td colspan="2">0</td></tr>
<tr><td>Required SWL</td><td>100</td><td>Equivalent ECTS</td><td colspan="2">4</td></tr>
<tr><td colspan="5">Course Content</td></tr>
<tr><td colspan="5">Origins of engineering economy, Principles of engineering economy, Design and manufacturing processes and EE, Cost estimation and cost terminology, Accounting, Balance sheet, Profit loss statement, Concept of equivalence, Money time relationships, Simple and compound interest rates, Single amounts and uniform series, Increasing and decreasing gradient, Application of money, Time relationships, Present value, Internal rate of return, External rate of return, Payback period, Evaluation of alternatives for different useful life and study period, Depreciation methods, Replacement analysis, Determination of the economic life of challenger and defender, Engineering economy techniques for evaluation of public projects.</td></tr>
<tr><td colspan="5">Used in Program / Level</td></tr>
<tr><td colspan="3">Program Name or requirement</td><td colspan="2">Study Level</td></tr>
<tr><td colspan="3">Faculty Requirement Elective</td><td colspan="2"></td></tr>
<tr><td colspan="5">Assessment Criteria</td></tr>
<tr><td>Student Activities</td><td>Mid-Term Exam</td><td>Practical Exam</td><td colspan="2">Final Exam</td></tr>
<tr><td>35%</td><td>25%</td><td>0%</td><td colspan="2">40%</td></tr>
<tr><td>Exam Duration [Hours]</td><td>1</td><td></td><td colspan="2">2</td></tr>
<tr><td colspan="5">Equivalent to other course in another university</td></tr>
<tr><td>University</td><td colspan="4"></td></tr>
<tr><td>Course code and title</td><td colspan="4"></td></tr>
</table>

2. Course Aims

By the end of the course the students will be able to:

- Complete computations and manipulations using the basic engineering economic equations.
- Use engineering economy to compare alternatives by different methods (ex., the present worth, annual cost, ROR analysis, and benefit and cost ratio).
- Take economic value into account in virtually any project environment.

3. Program Competencies Served by Course.

- A: Faculty Requirements (A1, A8)
  - A1: Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics.
  - A8: Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.

- B: Discipline Competences (B4)
  - Bm4: Adopt suitable national and international standards and codes; and integrate legal, economic and financial aspects to: design, build, operate, inspect and maintain mechanical equipment and systems.

4. Learning Outcomes (LOs)

Cognitive Domain	
1	Explain engineering economy fundamentals
2	Evaluate different investment/service projects economically
	N/A
Psychomotor Domaine	
3	Write down spreadsheet economic functions for different applications.
	N/A
	N/A
Affective Domaine	
4	Appreciate self-reliance or/and group activities to objectively approach problem solving.
	N/A
	N/A

5. Course LOs Mapping with Level of Competencies

LOs	Competences		
	A1	**A8**	**Bm4**
Cognitive Domain			
1	●		
2	●		●
Psychomotor Domaine			
3	●	●	
Affective Domaine			
4		●	

6. Assessment and Feedback Strategy

- Assignments (formative in the form of solving problems)
- Report

- Written examinations

7. Teaching and Learning Methods

- Interactive Lectures
- Interactive Tutorials
- Self-reading

8. List of References

- Blank, L. and Tarquin, A. “Engineering Economy”, 8th edition, 2018, by the McGraw-Hill Companies. **ISBN-13: 978-0073523439**
- Sullivan, W. G., Wicks, E., M., and Koelling, C. P., “Engineering Economy”, 16th Edition, 2015, by Pearson Higher Education

9. Study Plan

No	Course Content	Lecture (hrs)	Tutorial (hrs)
1	Introduction, general discussion and new terminologies (time value of money)	**2**	**1**
2	Simple, compound interest rates, payment types, equivalence, and cash flow diagram representation.	**2**	**1**
3	Factors, effect of time and interest on money (F/P, P/F, P/A, A/P, F/A and A/F factors)	**2**	**1**
4	Combining factors, shifted series and single cash flows	**2**	**1**
5	Factors, effect of time and interest on money (P/G and A/G and Geometric gradient payments).	**2**	**1**
6	Combining factors for shifted gradient.	**2**	**1**
7	Nominal and effective interest rates (differences, terminologies, and different cases)	**2**	**1**
8	Nominal and effective interest rates (continuous compounding) and introduction to evaluating alternatives.	**2**	**1**
9	Evaluating Alternatives (present worth analysis using LCM and study periods)	**2**	**1**
10	Evaluating Alternatives (Future worth and annual worth analysis) and Capitalized cost.	**2**	**1**
11	ROR Analysis for a Single Alternative	**2**	**1**
12	Benefit and cost analysis for a single project	**2**	**1**
13	Incremental benefit and cost analysis for multiple projects	**2**	**1**
14	Breakeven analysis for a single and multiple projects.	**2**	**1**
15	Payback Analysis and depreciation	**2**	**1**
Total Number of Hours		**30**	**15**

10. Course Content / LO Matrix

Course Content	1	2	3	4
Introduction, general discussion and new terminologies (time value of money)	x			
Simple, compound interest rates, payment types, equivalence, and cash flow diagram representation.	x		x	
Factors, effect of time and interest on money (F/P, P/F, P/A, A/P, F/A and A/F factors)	x		x	x
Combining factors, Shifted series and single cash flows	x			
Factors, effect of time and interest on money (P/G and A/G and Geometric gradient payments).	x			x
Combining factors for shifted gradient.	x			
Nominal and effective interest rates (differences, terminologies, and different cases)	x			
Nominal and effective interest rates (continuous compounding) and introduction to evaluating alternatives.	x			
Evaluating Alternatives (present worth analysis using LCM and study periods)	x	x	x	
Evaluating Alternatives (Future worth and annual worth analysis and Capitalized cost)		x	x	
ROR Analysis for a Single Alternative	x	x	x	
Benefit and cost analysis for a single project	x	x		
Incremental benefit and cost analysis for multiple projects	x	x		
Breakeven analysis for a single and multiple project.	x	x		
Payback Analysis and depreciation	x			

11. Assessment and Feedback Strategies / LOs Matrix

Assessment	1	2	3	4
Assignments (solving problems) and report	x	x	x	x
Mid Term	x			
Quizzes	x	x		
Final Exam		x		

12. Teaching and Learning Methods / LO Matrix

Learning Method	1	2	3	4
Interactive Lectures	x	x		x
Interactive Tutorial Sessions	x	x	x	x
Self-reading	x		x	x

Course Specification

1. Basic Information

MDP232	**Industrial Project Management**		**2 CH**
Prerequisites			
Number of weekly Contact Hours			
Lecture	Tutorial	Laboratory	
2	1	0	
Required SWL	100	Equivalent ECTS	4
Course Content			
Definitions used in project management, The project life cycle, Project stages, Relationships and responsibilities of the different project parties, Work Breakdown Structure (WBS) and Linear Responsibility Chart (LRC), Project Scheduling, Network planning: Activity on arrow, Activity on node, CPM, PERT, Progress monitoring, Project crashing, Progress curves, Resource allocation and levelling. Project productivity, Quality management.			
Used in Program / Level			
Program Name or requirement	Study Level		
Faculty Requirement Elective	2		
Assessment Criteria			
Student Activities	Mid-Term Exam	Practical Exam	Final Exam
35%	25%	0%	40%
Exam Duration [Hours]	1Hrs		2Hrs
Equivalent to other course in another university			
University	N/A		
Course code and title	N/A		

2. Course Aims

The aim of this course is to provide students with the needed knowledge and skills, which enable them to apply the project management basics, theories, and techniques to real project activities.

3. Program Competencies Served by Course.

- A: Faculty Requirements (A6, A10)
    - **A6.** Plan, supervise and monitor implementation of engineering projects.

- **A10:** Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.

- C: Design and Production requirements (C3)
  - **C3**: Implement basics of industrial engineering to analyse, plan and design production systems.

4. Learning Outcomes (LOs)

a.	Knowledge and understanding
a1	Explain the key decisions in project management
a2	Outline the Work Breakdown Structure (WBS)
a3	Explain the basics of a Gantt chart
a4	Identify the Critical Path Method (CPM)
a5	Identify the Program Evaluation and Review Technique (PERT)
a6	List the project cost management techniques
b.	Intellectual skills
b1	Design the WBS
b2	Analyze the Gantt chart method
b3	Design activities as CPM
b4	Design activities as PERT
b5	Demonstrate the project cost management techniques.
c.	Professional and practice skills
c1	Differentiate between WBS forms
c2	Categorize project activities in WBS
c3	Represent project activities using Gantt charts
c4	Analyze project management activities using CPM
c5	Apply PERT fundamentals to programs within a project
c6	Manage costs and budgets of projects
d.	General and transferable skills
d1	Share ideas and communicate with others in oral and written formats

Cognitive Domain	
1	Apply project management techniques to plan project schedules
2	Apply project management techniques for to estimate time, cost, resources,…etc of projects
3	Illustrate project plan and project stages
Psychomotor Domaine	
	N/A
Affective Domaine	
4	Answer questions in the lectures and discuss opinion

5. Course LOs Mapping with Level of Competencies

LOs	Competences		
	A6	**A10**	**C3**
Cognitive Domain			
1	●	●	●
2	●	●	●
3	●		●
Psychomotor Domaine			
Affective Domaine			
4	●		●

6. Assessment and Feedback Strategy

- Formative Assessment Methods:
  - Pop Quizzes
  - In-Class Discussion
- Summative Assessment Methods:
  - In-Class problem solving
  - Quizzes
  - Team Project
  - Written Exams

7. Teaching and Learning Methods

- Lectures
- Self-Readings
- Problem Solving
- Team Projects

8. List of References

a. **Course notes**
   -Developed by course instructors.
b. **Recommended books**
   - Project Management, Rajeev M. Gupta,
   - Operations management, W.J. Stevenson, McGraw-Hill

9. Study Plan

Week	Course Content	Lecture Hours	Tutorial Hours
1	Introduction	2	1
2	Project management Key decisions	2	1
3	WBS	2	1
4	Linear Responsibility Chart	2	1
5	Project Scheduling and Gantt chart	2	1
6	Time and cost estimation	2	1

7	Network planning	2	1
8	CPM	2	1
9	PERT	2	1
10	Project crashing	2	1
11	Progress curves and Progress monitoring	2	1
12	Resource allocation and levelling	2	1
13	Project productivity	2	1
14	Quality management of projects	2	1
15	Assignments discussions	2	1
	Total Hours	**30**	**15**

10. Course Content / LOs Matrix

Topic	Course Content	1	2	3	4
1	Introduction			●	
2	Project management Key decisions			●	
3	WBS			●	
4	Linear Responsibility Chart			●	
5	Project Scheduling and Gantt chart			●	●
6	Time and cost estimation		●		
7	Network planning	●			
8	CPM	●			●
9	PERT	●			●
10	Project crashing	●			
11	Progress curves and Progress monitoring			●	
12	Resource allocation and levelling		●		●
13	Project productivity			●	
14	Quality management of projects	●		●	
15	Assignments discussions				●

11. Assessment and Feedback Strategies / LOs Matrix

Assessment	1	2	3	4
In Class Discussion				●
In-Class problem solving				●
Quizzes	●	●	●	
Team Project	●	●	●	●
Mid-Term Exam	●		●	
Final Exam	●	●	●	

12. Teaching & Learning Methods / LOs Matrix

Learning Method	1	2	3	4
Lectures	●	●	●	●
Self-Readings				●
Problem Solving	●	●		●
Team Projects	●	●	●	●

Course Specifications

1. Basic Information

<table>
<tr><td colspan="2">PHM 112s</td><td colspan="8">Differential Equations and Numerical Analysis</td><td colspan="2">4 CH</td></tr>
<tr><td colspan="2">Prerequisites</td><td colspan="10">Mathematics (2) (PHM 013s)</td></tr>
<tr><td colspan="12">Number of weekly Contact Hours</td></tr>
<tr><td colspan="4">Lecture</td><td colspan="4">Tutorial</td><td colspan="4">Laboratory</td></tr>
<tr><td colspan="4">3</td><td colspan="4">2</td><td colspan="4">0</td></tr>
<tr><td colspan="3">Required SWL</td><td colspan="3">150</td><td colspan="3">Equivalent ECTS</td><td colspan="3">6</td></tr>
<tr><td colspan="12">Course Content</td></tr>
<tr><td colspan="12">First Order Differential Equations, Higher Order Differential equations, Laplace Transform, Fourier Series, Partial Differential Equations, Numerical Methods for Solving Ordinary Differential Equations, Numerical Methods for Solving Partial Differential Equations.</td></tr>
<tr><td colspan="12">Used in Program / Level</td></tr>
<tr><td colspan="8">Program Name or requirement</td><td colspan="4">Study Level</td></tr>
<tr><td colspan="8">Civil Engineering Requirement
Mechanical Engineering Requirement</td><td colspan="4">1</td></tr>
<tr><td colspan="12">Assessment Criteria</td></tr>
<tr><td colspan="3">Student Activities</td><td colspan="3">Mid-Term Exam</td><td colspan="3">Practical Exam</td><td colspan="3">Final Exam</td></tr>
<tr><td colspan="3">20 %</td><td colspan="3">20%</td><td colspan="3">0 %</td><td colspan="3">60 %</td></tr>
<tr><td colspan="3">Exam Duration [Hours]</td><td colspan="3">1</td><td colspan="3"></td><td colspan="3">3</td></tr>
</table>

2. Course Aims

The aim of this course is to provide students with the ability to identify and solve different types of ordinary differential equations, expand periodic functions by Fourier series, evaluate Laplace transform of different functions, classify and solve different types of partial differential equations, and apply numerical methods to solve ordinary and partial differential equations.

3. Program Competencies Served by Course

B: Program Competences (B1c)

B1c. Select appropriate and sustainable technologies for construction of buildings, infrastructures and water structures; using either numerical techniques or physical measurements and/or testing by applying a full range of civil engineering concepts and techniques of: Structural Analysis and Mechanics, Properties and Strength of Materials, Surveying, Soil Mechanics and Fluid Mechanics.

4. Learning Outcomes (LOs)

Cognitive Domain	
1	Select suitable method for solving, numerically and analytically, different types of ordinary and partial differential equations.
2	Evaluate Laplace transform for specified functions and solve differential/integral equations using Laplace transform.
3	Apply Fourier series for expanding periodic functions and solving boundary value problems.
Psychomotor Domain	
4	Draw graphically periodic functions and solution of specific types of differential equations modelling engineering problems.
	N/A
	N/A
Affective Domain	
5	Discuss the role of differential equations in modelling and understanding engineering problems.
	N/A
	N/A

5. Course LOs Mapping with Level of Competencies

For Civil Engineering:

LOs	Competences
	B1c
1	●
2	●
3	●
4	●
5	●

For Mechanical Engineering:

LOs	Competences
	B1m
1	●
2	●
3	●
4	●
5	●

6. Assessment and Feedback Strategy

1. Assignments (online, written)
2. Quizzes (online, written)
3. Written examinations (midterm & final term)

7. Teaching and Learning Methods

- Interactive Lectures (including distance learning by using Microsoft Teams platform)
- Tutorials (including distance learning by using Microsoft Teams platform)
- Self-Readings

8. List of References

- D. G. Zill. A First Course in Differential Equations with Modeling Applications – 10th Edition. Publisher: Cengage Learning, 2013. ISBN 13: 978-1111827052.

- D. G. Zill. Differential Equations with Boundary-Value Problems – 9th Edition. Publisher: Cengage Learning, 2016. ISBN-13: 978-1305965799.

- E. Kreyszig. Advanced Engineering Mathematics – 10th Edition. John Wiley, 2011. ISBN-13 : 978-0470458365.

9. Study Plan

Week	Course Content	Lecture Hours	Tutorial Hours
1	Introduction to ordinary differential equations (ODEs). Methods of solution for 1st order ODEs.	**3**	**2**
2	Methods of solution for 1st order ODEs (Continue).	**3**	**2**
3	Second order ODEs reduced to first order ODEs, Introduction to Linear ODEs with constant coefficients. Finding the complementary function solution.	**3**	**2**

4	Finding particular integral solution using method of variation of parameters. Introducing Operator method to find the particular integral solution.	**3**	**2**
5	Operator method (continue). Solving System of ODEs by operator method.	**3**	**2**
6	Introduction to Laplace transform, finding Laplace transform of elementary functions.	**3**	**2**
7	Inverse Laplace transform and convolution theorem.	**3**	**2**
8	Solving differential and integral equations using Laplace transform.	**3**	**2**
9	Numerical methods for solving ordinary differential equations.	**3**	**2**
10	Fourier series expansion of periodic functions.	**3**	**2**
11	Introduction to partial differential equations (PDEs), classification, solution.	**3**	**2**
12	Method of separation of variables for the solution of PDEs.	**3**	**2**
13	Applying the method of separation of variables to Wave equation.	**3**	**2**
14	Numerical methods for solving partial differential equations.	**3**	**2**
15	Revision	**3**	**2**
Total Number of Hours		**45**	**30**

10. Course Content / LOs Matrix

	Course Content	1	2	3	4	5
1	Introduction to ordinary differential equations (ODEs).	●				●
2	Methods of solution for 1st order ODEs.	●				
3	Second order ODEs reduced to first order ODEs, Introduction to Linear ODEs with constant coefficients. Finding the complementary function solution.	●				
4	Finding particular integral solution using method of variation of parameters.	●				
5	Introducing Operator method to find the particular integral solution. Solving System of ODEs by operator method.	●				
6	Introduction to Laplace transform, finding Laplace transform of elementary functions.		●			
7	Inverse Laplace transform and convolution theorem.		●			
8	Solving differential and integral equations using Laplace transform.	●	●		●	●
9	Numerical methods for solving ordinary differential equations.	●				
10	Fourier series expansion of periodic functions.			●	●	

11	Introduction to partial differential equations (PDEs), classification, solution.	●				●
12	Method of separation of variables for the solution of PDEs.	●				
13	Applying the method of separation of variables to Wave equation.	●		●	●	
14	Numerical methods for solving partial differential equations.	●				

11. Assessment and Feedback Strategies / LOs Matrix

Assessment	1	2	3	4	5
Assignments	●	●	●	●	●
Quizzes	●	●	●		
Mid-Term Exam	●	●			
Final Exam	●	●	●		

12. Teaching & Learning Methods / LOs Matrix

Learning Method	1	2	3	4	5
Interactive Lectures	●	●	●	●	●
Tutorial	●	●	●	●	
Self-Reading					●

Course Specification

1. Basic Information

PHM 131S	Rigid Body Dynamics						2 CH
Prerequisites	Dynamics						
Number of weekly Contact Hours							
Lecture		Tutorial			Laboratory		
2		2			0		
Required SWL		100		Equivalent ECTS		4	
Course Content							
Kinematics of rigid body: Types of motion, instantaneous center of rotation, rolling without slipping and with slipping. Kinetics of rigid body: Newton's equations of motion and applications. Work and energy principle: Application on conservative and non-conservative fields of forces. Impulse and momentum principle: Linear and angular impulse and momentum, impact of rigid bodies.							
Used in Program / Level							
Program Name or requirement					Study Level		
1st year Mechanical Engineering programs.					1		
Assessment Criteria							
Student Activities		Mid-Term Exam		Practical Exam		Final Exam	
15%		25%		0%		60%	
Exam Duration [Hours]		1.5				2	
Equivalent to other course in another university							
University		N/A					
Course code and title		N/A					

2. Course Aims

The aims of this course are to develop the student's capabilities to:

- Recognize the fundamental principles of kinematics of a rigid body.
- Analyze the concepts of planar motion and its types (translation, rotation, and general plane motion) of a rigid body or systems of connected bodies using vector and scalar methods.
- Learn how to represent and apply relations of position, velocity, and acceleration for rolling motion problems.
- Study and analyze the various principles of Kinetics such as force-acceleration, work-energy, and the impulse-momentum principles for various types of problems that containing the motion of a rigid body.

3. Program Competencies Served by Course.

- A: Faculty Requirements
  - **A1**: Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics.
  - **A2**: Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess, and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.
  - **A5**: Practice research techniques and methods of investigation as an inherent part of learning.
  - **A7**: Function efficiently as an individual and as a member of multi-disciplinary and multi-cultural teams.

- **Program Competences**
  - D1: Understand and Operate physical systems applicable to the specific discipline by applying the concepts of Thermodynamics, Fluid Mechanics, Instrumentation and Control Theory, and Systems.

4. Learning Outcomes (LOs)

a.	Knowledge and understanding
a1	Define kinematical quantities: position, velocity and acceleration for a moving rigid body.
a2	Define the equations of motion of a rigid body for any type of motion and analyze the properties of this type.
a3	Explain the alternative analysis of Kinetics such as work and energy, impulse and momentum methods.
b.	Intellectual skills
b1	Discriminate between different types of motion.
b2	Formulate the kinematic and kinetic equations in order to describe the motion of the rigid body.
c.	Professional and practice skills
c1	Design and perform experiments for motion studies.
d.	General and transferable skills
d1	Work effectively in a team and develop the skills which are related to creative thinking, problem solver, and teamwork in different fields of the motion of rigid bodies.

Cognitive Domain	
1	Illustrate terminologies related to the motion of the rigid body
2	Apply the equations of motion of a rigid body for any type of motion and analyze the properties of this type.
3	Design a system of connected rigid bodies in motion and perform a kinetic analysis such as work and energy, impulse and momentum methods.
Psychomotor Domaine	
4	Formulate the kinematic and kinetic equations in order to describe the motion of the rigid body.
Affective Domaine	
5	Discusses recommended readings information.

5. Course LOs Mapping with Level of Competencies

LOs	Competences				
	A1	A2	A5	A7	D1
Cognitive Domaine					
1	•		•	•	•
2	•	•		•	•
3	•	•	•		•
Psychomotor Domain					
4					
Affective Domaine					
5				•	•

6. Assessment and Feedback Strategy

- Formative Assessment Methods:
  - In-Class Discussion
- Summative Assessment Methods:
  - Assignments (online on lms, written)
  - Quizzes (online on lms as MCQ exam).
  - Mid-Term Exam (written exam as MCQ in campus).
  - Final Exam (written exam as MCQ in campus).

7. Teaching and Learning Methods

- Interactive Lecture (including distance learning using Microsoft Teams platform).
- Tutorial (including distance learning using Microsoft Teams platform).
- Self-Learning

8. List of References

Hibbeler R.C., " Engineering Mechanics: Dynamics ", 13th Edition, 2013.

Beer F., Johnston R. and Claysen W., "Vector Mechanics for Engineering", McGrawHill, 7th Edition, 2005.

9. Study Plan

Week no	Course Content	Lecture	Tutorial	Total
1	Planar kinematics of a rigid body, Translation, rotation, and general motion	2	2	4
2	Rotation about a fixed axis. Angular measurements.	2	2	4
3	Velocity analysis: Vector analysis.	2	2	4
4	Velocity analysis: instantaneous center of rotation.	2	2	4
5	Acceleration analysis.	2	2	4
6	Kinematics of rolling motion: Theory and analysis	2	2	4
7	Rolling motion: Applications (Slipping and no slipping).	2	2	4
8	Kinetics of a rigid body. Force-Acceleration method.	2	2	4
9	Equations of motion: translation, rotation.	2	2	4
10	Equations of motion: general plane motion.	2	2	4
11	Kinetics of rolling problems.	2	2	4
12	Kinetics of a rigid body. Work-energy method.	2	2	4
13	Conservative and non-conservative field of forces.	2	2	4
14	Kinetics of a rigid body. Impulse-momentum method.	2	2	4
15	Impact problems.	2	2	4
Total Number of Hours		30	30	60

10. Course Content/ LO Matrix

Topic	Course Content	1	2	3	4	5
1	Planar kinematics of a rigid body, Translation, rotation and general motion	●				
2	Rotation about a fixed axis. Angular measurements.	●	●	●		
3	Velocity analysis: Vector analysis.	●	●			●
4	Velocity analysis: instantaneous center of rotation.	●	●	●		
5	Acceleration analysis.	●	●	●	●	
6	Kinematics of rolling motion: Theory and analysis	●	●		●	●
7	Rolling motion: Applications (Slipping and no slipping).	●	●	●		
8	Kinetics of a rigid body. Force-Acceleration method.	●	●	●	●	●
9	Equations of motion: translation, rotation.	●	●	●		
10	Equations of motion: general plane motion.	●	●	●	●	
11	Kinetics of rolling problems.	●	●	●	●	

12	Kinetics of a rigid body. Work-energy method.	●	●	●	●	●
13	Conservative and non-conservative field of forces.	●	●	●	●	●
14	Kinetics of a rigid body. Impulse-momentum method.	●	●		●	●
15	Impact problems.	●	●	●	●	●

11. Course Contents/ LO Matrix

Assessment	1	2	3	4	5
Assignments	●	●	●		●
Quizzes				●	●
Mid-Term	●	●		●	
Final Exam	●	●	●	●	

12. Teaching & Learning Methods / Los Matrix

Learning Method	1	2	3	4	5
Interactive Lectures	●	●	●	●	
Self-Readings	●	●	●		●
Problem Solving (Studio-Based Assignments)			●	●	

Course Specification

1. Basic Information

<table>
<tr><td colspan="2">MEP111</td><td colspan="8">Thermal Physics</td><td colspan="2">2 CH</td></tr>
<tr><td colspan="2">Prerequisites</td><td colspan="10"></td></tr>
<tr><td colspan="12">Number of weekly Contact Hours</td></tr>
<tr><td colspan="4">Lecture</td><td colspan="4">Tutorial</td><td colspan="4">Laboratory</td></tr>
<tr><td colspan="4">1</td><td colspan="4">2</td><td colspan="4">0</td></tr>
<tr><td colspan="3">Required SWL</td><td colspan="3">100</td><td colspan="3">Equivalent ECTS</td><td colspan="3">4</td></tr>
<tr><td colspan="12">Course Content</td></tr>
<tr><td colspan="12">Thermal System, Control Volume, States of the Working Medium, Processes and Cycles, Calculation of Work, Heat Exchange with the Surroundings, Ideal Gases, Specific Heat at Constant Volume, Specific Heat at Constant Pressure, Equation of State, Pure Substances, Phase Equilibrium, Tables of Thermodynamic Properties, Internal Energy, Enthalpy, First Law of Thermodynamics on Closed Systems, First Law of Thermodynamics on Steady State Steady Flow Open Systems, The Case of Uniform State Uniform Flow, Application on Reciprocating Compressors, Ideal Gas Mixtures.</td></tr>
<tr><td colspan="12">Used in Program / Level</td></tr>
<tr><td colspan="8">Program Name or requirement</td><td colspan="4">Study Level</td></tr>
<tr><td colspan="8">Mechanical Engineering Requirement</td><td colspan="4">1</td></tr>
<tr><td colspan="12">Assessment Criteria</td></tr>
<tr><td colspan="3">Student Activities</td><td colspan="3">Mid-Term Exam</td><td colspan="3">Practical Exam</td><td colspan="3">Final Exam</td></tr>
<tr><td colspan="3">35%</td><td colspan="3">25%</td><td colspan="3">0%</td><td colspan="3">40%</td></tr>
<tr><td colspan="3">Exam Duration [Hours]</td><td colspan="3">1</td><td colspan="3"></td><td colspan="3">3</td></tr>
<tr><td colspan="12">Equivalent to other course in another university</td></tr>
<tr><td colspan="3">University</td><td colspan="9"></td></tr>
<tr><td colspan="3">Course code and title</td><td colspan="9"></td></tr>
</table>

2. Course Aims

By the end of the course the students will be able to:

- Identify energy transformation processes in thermal systems.
- Identify state points of thermal systems.
- Identify thermodynamic terminology such as process, path, cycle, internal energy, enthalpy, heat and work.
- Represent any process on property diagrams such as p-v and T-v plots.
- Explicitly define the first law of thermodynamics and represent its forms.
- Use Thermodynamic tables and EES software to determine state and properties of a substance.
- Determine the relationship between different thermodynamic properties.
- Differentiate between open and closed systems, ideal and real gases, intensive and extensive properties.
- Apply the first law of thermodynamics on engineering systems.

3. Intended Learning Outcomes (ILOs)

a.	Knowledge and understanding
a1	Determine the relationship between different thermodynamic properties.
a2	Differentiate between the internal energy and enthalpy.
a3	Apply the ideal-gas equation of state.
a4	Apply the first law of thermodynamics.
b.	Intellectual skills
b1	Analyze problems of thermal system.
b2	Identify different state points and processes of thermal systems.
b3	Perform energy balance on thermal systems.
c.	Professional and practice skills
c1	Efficiently use tables and EES software to determine thermodynamic properties.
c2	Represent thermal system and associated processes on p-v or T-v diagram.
d.	General and transferable skills
d1	Effectively manage tasks and time.
d2	Get familiar with team-work environment.
d3	Develop the creative thinking and problem-solving skills.

4. Assessment and Feedback Strategy

- Assignments
- Quizzes
- Written examination (midterm & final)

5. Teaching and Learning Methods

- Lectures
- Tutorials
- Practical
- Self-learning

6. List of References

- Yunus A. Cengel and Michael A. Boles, *"**Thermodynamics: an engineering approach**"*, 5th edition, New York: McGraw-Hill, ISBN 0-07-288495-9.

7. ILOs Mapping with Level of Competencies

ILOs	Level of Competences			
	A1	A4	A7	B1m
a. Knowledge and understanding				
a1	•			•
a2	•			
a3	•			•
a4	•			•
b. Intellectual skills				
b1	•			•
b2	•			•
b3	•			•
c. Professional and practice skills				
c1	•	•		
c2	•			
d. General and transferable skills				
d1			•	
d2			•	
d3			•	

8. Study Plan

Week	Course Content	Lecture Hours	Tutorial Hours
1	Introduction ***(Chapter 1).***	**1**	**2**
2	Basic concepts: Temperature and pressure ***(Chapter 1).***	**1**	**2**
3	Energy, energy transfer ***(Chapter 2).***	**1**	**2**
4	Energy analysis: Work and heat ***(Chapter 2).***	**1**	**2**
5	First law of thermodynamics ***(Chapter 2).***	**1**	**2**
6	Properties of pure substances: phase change, property diagrams ***(Chapter 3).***	**1**	**2**
7	Properties of pure substances: property tables, EES software and the ideal gas equation of state ***(Chapter 3).***	**1**	**2**
8	Energy analysis of closed systems: energy balance, internal energy, enthalpy ***(Chapter 4).***	**1**	**2**
9	Energy analysis of closed systems: specific heats ***(Chapter 4).***	**1**	**2**
10	Mass and energy analysis of control volumes: conservation of mass, flow work, energy analysis of steady-flow systems ***(Chapter 5).***	**1**	**2**
11	Thermodynamics' applications: Nozzles & Diffusers ***(Chapter 5).***	**1**	**2**
12	Thermodynamics' applications: Turbines & Compressors ***(Chapter 5).***	**1**	**2**
13	Thermodynamics' applications: Mixing & Heat exchangers ***(Chapter 5).***	**1**	**2**
14	Simple-ideal power cycles: Brayton cycle ***(Chapter 9&10).***	**1**	**2**
15	Simple-ideal power cycles: Rankine cycle ***(Chapter 9&10).***	**1**	**2**
Total Number of Hours		**15**	**30**

9. Course Content / ILO Matrix

Wk	Course Content	a1	a2	a3	a4	b1	b2	b3	c1	c2	d1	d2	d3
1	Introduction.	•					•						
2	Basic concepts: Temperature and pressure.	•					•						
3	Energy, energy transfer.		•			•							
4	Energy analysis: Work and heat.		•			•				•			
5	First law of thermodynamics.				•	•					•	•	
6	Properties of pure substances: phase change, property diagrams.	•					•		•	•			
7	Properties of pure substances: property tables, EES software and the ideal gas equation of state.	•		•			•		•	•	•		
8	Energy analysis of closed systems: energy balance, internal energy, enthalpy.	•	•	•		•		•		•			•
9	Energy analysis of closed systems: specific heats.	•	•	•		•		•					•
10	Mass and energy analysis of control volumes: conservation of mass, flow work, energy analysis of steady-flow systems.		•	•	•	•		•			•		•
11	Thermodynamics' applications: Nozzles & Diffusers.				•	•		•	•				•
12	Thermodynamics' applications: Turbines & Compressors				•	•		•	•				•
13	Thermodynamics' applications: Mixing & Heat exchangers.				•	•		•	•				•
14	Simple-ideal power cycles: Brayton cycle.		•		•	•		•			•	•	•
15	Simple-ideal power cycles: Rankine cycle.				•	•		•	•		•	•	•

10. Assessment Methods / ILO Matrix

Assessment	a1	a2	a3	a4	b1	b2	b3	c1	c2	d1	d2	d3
Assignments	•	•	•	•	•	•	•	•	•	•	•	•
Projects			•	•	•	•	•	•	•	•	•	•
Quizzes	•	•	•			•			•	•		•
Mid-Term Exam	•	•	•		•	•	•			•		•
Final Exam	•	•	•	•	•	•	•	•	•	•		•

11. Learning Method / ILO Matrix

Learning Method	a1	a2	a3	a4	b1	b2	b3	c1	c2	d1	d2	d3
Lectures	•	•	•	•	•	•	•		•			
Tutorials	•	•	•	•	•	•	•	•	•	•	•	•
Practical	•	•	•	•	•	•	•	•	•	•	•	•
Self-learning				•				•				

Course Specification

1. Basic Information

MEP211	Thermodynamics	4 CH
Prerequisites	Thermal Physics – MEP 111	

Number of weekly Contact Hours		
Lecture	Tutorial	Laboratory
3	2	1

Required SWL	150	Equivalent ECTS	6

Course Content
Heat Engines, Refrigerator and Heat Pump, Second Law of Thermodynamics, Kelvin Plank Statement, Clausius Statement, Clausius Inequality, Entropy, Irreversibility, Reversible Process, Entropy Change of a Reversible Process, Entropy Change of Solids and Liquids, Entropy Change of Ideal Gases, Gibbs Relations, Isentropic Process, Entropy Increase Principle, Exergy and Availability, Reversible Work, Exergy Destruction Principle, The Second Law Efficiency, Air Standard Cycles, Vapor Cycles, Property Diagrams.

Used in Program / Level	
Program Name or requirement	Study Level
Mechanical Engineering Requirement	1

Assessment Criteria			
Student Activities	Mid-Term Exam	Practical Exam	Final Exam
25%	25%	10%	40%
Exam Duration [Hours]	1		3

Equivalent to other course in another university	
University	
Course code and title	

2. Course Aims

By the end of the course, the students will be able to:

- Demonstrate knowledge of the second law of thermodynamics.
- Perform entropy analysis of thermodynamic systems.
- Calculate the irreversibility and entropy generation.
- Perform exergy analysis of thermodynamic systems.
- Analyze thermodynamic cycles from the point of view of the first law of thermodynamics as well as the second law of thermodynamics.

3. Program Competencies Served by Course.

- A: Faculty Requirements (A1, A2, A3)
  - A1: Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.
  - A2: Develop and conduct appropriate experimentation and/or simulation, analyse and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.
- B: Program Competences (B1m)
  - B1m: Model, analyse and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations.

Learning Outcomes (LOs)

Cognitive Domain	
1	Apply thermodynamic principles to solve engineering problems.
Psychomotor Domain	
2	Design thermodynamic system (power cycles, heat pumps, refrigerator, .. etc) to achieve a specific design objective, such as achieving the maximum efficiency or power.
Affective Domain	
3	Discuss and analyze the thermodynamic systems with respect to the fist and second laws of thermodynamics.

Mapping

LOs	Competences		
	A1	A2	B1m
Cognitive Domain			
1	●		
Psychomotor Domaine			
2			●
Affective Domaine			
3		●	●

4. Assessment and Feedback Strategy

- Assignments
- Quizzes
- Written examination (midterm & final)

5. Teaching and Learning Methods

- Lectures
- Tutorials
- Self-learning

6. List of References

- Yunus A. Cengel and Michael A. Boles, *"Thermodynamics: an engineering approach"*, 5th edition, New York: McGraw-Hill, ISBN 0-07-288495-9, 2006.
- Borgnakke, Claus, and Richard E. Sonntag, "*Fundamentals of Thermodynamics*", Wiley Global Education, 8th edition, 2016. ISBN-13: 978-1118131992.

7. Study Plan

Week	Course Content	Lecture Hours	Tutorial Hours	Lab Hours
1	Review of the first law of thermodynamics	**3**	**2**	**-**
2	Heat engines, heat pumps, and refrigerators	**3**	**2**	**-**
3	Thermal efficiency and coefficient of performance (COP)	**3**	**2**	**-**
4	Carnot cycle	**3**	**2**	**-**
5	The Second law of thermodynamics	**3**	**2**	**-**
6	Entropy	**3**	**2**	**-**
7	Clausius inequality	**3**	**2**	**-**
8	Entropy generation principle	**3**	**2**	**-**
9	Exergy	**3**	**2**	**-**
10	Exergy destruction principle and the second law efficiency	**3**	**2**	**-**
11	Brayton cycle	**3**	**2**	**3**
12	Rankine cycle	**3**	**2**	**3**
13	Otto cycle	**3**	**2**	**3**
14	Diesel cycle	**3**	**2**	**3**
15	Refrigeration cycle	**3**	**2**	**3**
Total Number of Hours		**45**	**30**	**15**

8. Course Content / LO Matrix

Wk	Course Content	1	2	3
1	Review of the first law of thermodynamics	•		
2	Heat engines, heat pumps, and refrigerators	•		•
3	Thermal efficiency and coefficient of performance (COP)	•		
4	Carnot cycle	•		
5	The Second law of thermodynamics	•		
6	Entropy	•		
7	Clausius inequality	•		
8	Entropy generation principle	•		
9	Exergy	•		
10	Exergy destruction principle and the second law efficiency	•		
11	Brayton cycle		•	•
12	Rankine cycle		•	•
13	Otto cycle		•	•
14	Diesel cycle		•	•
15	Refrigeration cycle		•	•

9. Assessment Methods / LO Matrix

Assessment	1	2	3
Assignments	•	•	•
Lab			•
Quizzes	•		
Mid-Term Exam	•		
Final Exam	•		•

10. Learning Method / LO Matrix

Learning Method	1	2	3
Lectures	•	•	•
Tutorials	•		
Practical			•
Self-learning	•	•	•

Course Specification

1. Basic Information

<table>
<tr><td>MEP221</td><td colspan="3">Fluid Mechanics and Turbomachinery</td><td>4 CH</td></tr>
<tr><td>Prerequisites</td><td colspan="4">Differential Equations and Numerical Analysis</td></tr>
<tr><td colspan="5">Number of weekly Contact Hours</td></tr>
<tr><td colspan="2">Lecture</td><td>Tutorial</td><td colspan="2">Laboratory</td></tr>
<tr><td colspan="2">3</td><td>2</td><td colspan="2">1</td></tr>
<tr><td>Required SWL</td><td>175</td><td>Equivalent ECTS</td><td colspan="2">7</td></tr>
<tr><td colspan="5">Course Content</td></tr>
<tr><td colspan="5">Properties of Fluids, Density, Pressure, Pressure Measurement, Forces on Submerged Bodies, Viscosity, Viscous Boundary Layers, Continuum Hypothesis, Streamlines, Velocity and Acceleration, Continuity Equation, Classification of Flow Fields: Pipe Flow, Jet Flow, Wake Flow, Boundary Layer Flow, Flow in Closed Conduits, Bernoulli's Equation, Major and Minor Losses in Pipes, Laminar and Turbulent Flows, Similitude and Dimensional Analysis, Lagrangian and Eulerian Coordinates, Transport Theorem on a Control Volume, Navier-Stokes Equation, Flow around Immersed Bodies, Drag and Lift Forces, Compressible Flow, Stagnation Properties, Mach Number and Sonic Velocity, Equations of Gas Dynamics, Flow through Nozzles, Shock Waves, Classification of Turbomachines, Operation of Pumps, Series and Parallel Operation, Selection of Pumps.</td></tr>
<tr><td colspan="5">Used in Program / Level</td></tr>
<tr><td colspan="3">Program Name or requirement</td><td colspan="2">Study Level</td></tr>
<tr><td colspan="3">Mechatronics Engineering Program</td><td colspan="2">1</td></tr>
<tr><td colspan="5">Assessment Criteria</td></tr>
<tr><td>Student Activities</td><td>Mid-Term Exam</td><td>Practical Exam</td><td colspan="2">Final Exam</td></tr>
<tr><td>20%</td><td>25%</td><td>15%</td><td colspan="2">40%</td></tr>
<tr><td>Exam Duration [Hours]</td><td>1</td><td></td><td colspan="2">3</td></tr>
<tr><td colspan="5">Equivalent to other course in another university</td></tr>
<tr><td>University</td><td colspan="4"></td></tr>
<tr><td>Course code and title</td><td colspan="4"></td></tr>
</table>

2. Course Aims

By the end of the course, the students will be able to:

- Use the governing equation of the fluid statics to analyze the application of manometry and hydrostatic forces acting on different submerged surfaces.
- Apply control volume analysis using the concepts of continuity, energy, and momentum principles to fluid flow problems.
- Recognize the various aspects of laminar and turbulent flows in terms of shear stresses, velocity distributions, major and minor losses in pipe flows. In addition to identify the centrifugal pump characteristics and series and parallel pump connection.
- Apply dimensional analysis and similarity concept on any engineering application.
- Demonstrate understanding of the principle and application of Mach number, stagnation properties, nozzles, and shock waves.
- Apply differential analysis on fluid flow system using Navier-Stokes equation.
- Demonstrate understanding of the physics of flow over the immersed body, boundary layer theory, drag forces, lift forces, pressure gradients, and their effects on boundary layer separation and wake.

3. Program Competencies Served by Course.

- A: Faculty Requirements (A1, A2, A3)
    - A1: Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.
    - A2: Develop and conduct appropriate experimentation and/or simulation, analyse and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.
    - A3: Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.

- Bm: Discipline Competences (B1m)
    - B1m: Model, analyze and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations.

Learning Outcomes - LOs

Cognitive Domain	
1	Apply different theories to solve fluid problems
Psychomotor Domain	
2	Design fluid flow network (pump, pipeline, nozzle, ..etc) to achieve a specific objective
Affective Domain	
3	Discuss and analyze the fluid characteristics and the corresponding effect on the system

Mapping

LOs	Competences			
	A1	A2	A3	B1m
Cognitive Domain				
1	●			●
Psychomotor Domaine				
2		●	●	●
Affective Domaine				
3			●	●

4. Assessment and Feedback Strategy

- Assignments
- Quizzes
- Written examination (midterm & final)

5. Teaching and Learning Methods

- Lectures
- Tutorials
- Laboratory

6. List of References

- White, Frank M., "Fluid Mechanics", McGraw Hill seventh international edition, 2012
- Munson, Young, Okiishi," Fundamentals of Fluid Mechanics" ,sixth edition, John Wiley & Sons, Inc.,2009.
- Yunus A. Çengel & John Cimbala, "Fluid Mechanics Fundamentals and Applications" Edition in SI units, McGraw Hill, 2009.
- Streeter, V.L., Wylie, E.B. and Bedford ,K.W.," Fluid Mechanics "Ninth edition, McGraw Hill, 2004
- Class notes.

7. Study Plan

Week	Course Content	Lecture Hours	Tutorial Hours	Lab Hours
1	Properties of Fluids	**3**	**2**	**1**
2	Fluid Statics: Forces on Submerged Bodies	**3**	**2**	**1**
3	Reynolds Transport Theorem: Conservation of Mass	**3**	**2**	**1**
4	Reynolds Transport Theorem: Conservation of Momentum	**3**	**2**	**1**
5	Reynolds Transport Theorem: Conservation of Energy	**3**	**2**	**1**
6	Similitude and Dimensional Analysis	**3**	**2**	**1**
7	Viscous Flow in Ducts: Bernoulli Equation	**3**	**2**	**1**
8	Viscous Flow in Ducts: Major and Minor Losses	**3**	**2**	**1**
9	Classification of Turbomachines, Operation of Pumps, Series and Parallel Operation, Selection of Pumps	**3**	**2**	**1**
10	Compressible Flow: Thermodynamics	**3**	**2**	**1**
11	Compressible Flow: Convergent Nozzle	**3**	**2**	**1**
12	Compressible Flow: Convergent Divergent Nozzle – Shock Wave	**3**	**2**	**1**
13	Flow over Immersed Bodies: Lift and Drag	**3**	**2**	**1**
14	Flow over Immersed Bodies: Boundary Layer Theory	**3**	**2**	**1**
15	Naiver-Stokes Equation	**3**	**2**	**1**
Total Number of Hours		**45**	**30**	**15**

List of Experiments

Week	Course Content
1	Introduction to lab experiments
2	Determination of water density at room temperature
3	Determination of water surface tension at room temperature
4	Determination of hydrostatic pressure forces on a submerged plane surface
5	Determination of hydrostatic pressure forces on a partially submerged plane surface
6	Determination of the coefficient of discharge of a venturi-meter
7	Measurement of actual pressure distribution along a venturi-meter
8	Calculation pressure distribution along a venturi-meter
9	Impact of a water jet on a perpendicular flat surface
10	Laminar flow in a pipe
11	Friction losses in pipe
12	Measurements of losses in pipe fittings (bends, elbows)
13	Pump characteristics: Head versus discharge of a pump demonstration
14	Unsteady flow demonstration
15	Revision on all experiments

8. Course Content / ILO Matrix

Wk	Course Content	1	2	3
1	Properties of Fluids			•
2	Fluid Statics: Forces on Submerged Bodies	•		•
3	Reynold Transport Theorem: Conservation of Mass	•		•
4	Reynold Transport Theorem: Conservation of Momentum	•		•
5	Reynold Transport Theorem: Conservation of Energy	•		•
6	Similitude and Dimensional Analysis	•		
7	Viscous Flow in Ducts: Bernoulli Equation			•
8	Viscous Flow in Ducts: Major and Minor Losses		•	•
9	Classification of Turbomachines, Operation of Pumps, Series and Parallel Operation, Selection of Pumps		•	
10	Compressible Flow: Thermodynamics	•		
11	Compressible Flow: Convergent Nozzle		•	
12	Compressible Flow: Convergent Divergent Nozzle – Shock Wave		•	
13	Flow over Immersed Bodies: Lift and Drag	•		
14	Flow over Immersed Bodies: Boundary Layer Theory			•
15	Naiver-Stokes Equation			•

9. Assessment Methods / ILO Matrix

Assessment	1	2	3
Assignments	•	•	
Lab report			•
Quizzes	•		
Mid-Term Exam	•		•
Final Exam	•		•

10. Learning Method / ILO Matrix

Learning Method	1	2	3
Lectures	•	•	•
Tutorials	•	•	•
Practical			•

Course Specification

1. Basic Information

<table>
<tr><td colspan="2">MDP111</td><td colspan="4">Mechanical Engineering Drawing</td><td>3 CH</td></tr>
<tr><td colspan="2">Prerequisites</td><td colspan="5">Engineering Drawing</td></tr>
<tr><td colspan="7">Number of weekly Contact Hours</td></tr>
<tr><td colspan="2">Lecture</td><td colspan="2">Tutorial</td><td colspan="3">Laboratory</td></tr>
<tr><td colspan="2">1</td><td colspan="2">3</td><td colspan="3">2</td></tr>
<tr><td colspan="2">Required SWL</td><td>150</td><td colspan="2">Equivalent ECTS</td><td colspan="2">6</td></tr>
<tr><td colspan="7">Course Content</td></tr>
<tr><td colspan="7">According to Bylaw 2018:
In the tutorial these contents will be covered: Introduction to Machine parts and assembly drawing, Types of threaded fasteners and washers, Internal and external Thread Standards, definitions and drawings, Bearing drawings, types of fittings, Fits and Tolerances, Geometrical Tolerances, Surface Finish. Exercises on assembly drawings such as: crane hook, stuffing box, valves, grinding wheel drive, worm and worm gear, machine vice, hand press, transmission shaft, … etc.
In the Lab. These contents will be covered: Introduction to solid modelling on a CAD software such as SolidWorks, Inventor, or any other CAD, Sketcher workbench, Solid work features: applied features, pattern features, fillets, design tables. 3D Modelling techniques;3D Part design, Parametric part design. 3D Assembly. 3D animation. Drafting and 2D drawings: basics, cross sections, dimensions, fits and tolerance. Sheet metal design; Weldment features.</td></tr>
<tr><td colspan="7">Used in Program / Level</td></tr>
<tr><td colspan="5">Program Name or requirement</td><td colspan="2">Study Level</td></tr>
<tr><td colspan="5">Mechanical Engineering Requirement</td><td colspan="2">1</td></tr>
<tr><td colspan="5">Manufacturing Engineering Program</td><td colspan="2">1</td></tr>
<tr><td colspan="5">Energy and Renewable Energy Engineering Program</td><td colspan="2">1</td></tr>
<tr><td colspan="7">Assessment Criteria</td></tr>
<tr><td colspan="2">Student Activities</td><td colspan="2">Mid-Term Exam</td><td colspan="2">Practical Exam</td><td>Final Exam</td></tr>
<tr><td colspan="2">25%</td><td colspan="2">25%</td><td colspan="2">10%</td><td>40%</td></tr>
<tr><td colspan="2">Exam Duration [Hours]</td><td colspan="2">2</td><td colspan="2"></td><td>3</td></tr>
<tr><td colspan="7">Equivalent to other course in another university</td></tr>
<tr><td colspan="2">University</td><td colspan="5">Ain Shams University</td></tr>
<tr><td colspan="2">Course code and title</td><td colspan="5">MDP163, 2013 bylaw</td></tr>
</table>

2. Course Aims

This course aims to:

•Demonstrate knowledge and understanding the basic considerations of machine parts and assembly drawing.

•Illustrate of machine parts, application of manufacturing details and workshop working drawings.

•Recognize modeling techniques, Part design conceptual vision, concrete computer-based description, virtual worlds, physical prototyping and manufacturing.

•Introduce to solid modeling such as parametric part design. Procedural modeling. 3D solid modeling. Assembly: basics, design. Drafting: basics, workbench. Visualization. Generative shape design. Sheet metal design. Weldment features. Predictive analysis and simulation.

3. Program Competencies Served by Course

A3	Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.
B1m	Model, analyse and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations.

4. Learning Outcomes (LOs)

Cognitive Domain	
1	Recognize the Machine parts, assembly drawing and machining marks and the different types of fasteners, valves, power transmission machines, and vises
2	Characterize the differences modeling techniques and apply 3D solid modeling
Psychomotor Domaine	
3	Recognize how to construct the machine drawings, and solid parts modeling and simulation
Affective Domaine	
4	Demonstrate machine assembly model and extraction of drawing sheets (construction and assembly) and present relevant technical reports.

5. Course LOs Mapping with Level of Competencies

LOs	Level of Competences					
	A3	**B1m**				
Cognitive Domain						
1	√	√				
2		√				
Psychomotor Domaine						
3	√	√				
Affective Domaine						
4	√	√				

6. Assessment and Feedback Strategy

- Assignments and reports (online and on-campus)
- Pop- Quizzes (online and on-campus)
- Laboratory activities (online and on-campus using Autodesk Inventor)
- Written examination (midterm - online or on-campus)
- Written examination (final term - online or on-campus)

7. Teaching and Learning Methods

- Lectures (online) on MS Teams, and LMS
- Tutorial (online and on-campus) discussions on MS Teams and LMS
- Laboratory (online and on-campus) recorded videos and discussions on MS Teams and LMS

8. List of References

a. Essential books (text books)

I. Singh, A., 2012. Machine Drawing: Includes AutoCAD. Tata McGraw Hill Education.
II. Shih, R.H., 2001. Parametric Modeling with Autodesk Inventor R6. SDC Publications
III. Narayana, K.L., 2009. Machine drawing. New Age International.
IV. Nikola, J. Duhovnik, 2018, Advanced CAD Modeling, Springer **(EKB)**

b. Recommended books

Munford, P. and Normand, P., 2015. Mastering Autodesk Inventor 2016 and Autodesk Inventor LT 2016: Autodesk Official Press. John Wiley & Sons.

9. Study Plan

No.	Course Content	Lecture	Tutorial	Laboratory	Total
1	Introduction	1	3	2	6
2	Drawing Fasteners	1	3	2	6
3	Introduction to Couplings	1	3	2	6
4	Drawing Rigid couplings	1	3	2	6
5	Drawing Transmission Shafts	1	3	2	6
6	Drawing Flexible Couplings	1	3	2	6
7	Drawing Pulleys Brackets	1	3	2	6
8	Drawing Power Screws	1	3	2	6
9	Drawing Machine Vice	1	3	2	6
10	Drawing Pipe Vice	1	3	2	6
11	Drawing Screw Jacks	1	3	2	6
12	Drawing Safety Valve	1	3	2	6
13	Drawing Non-return valve	1	3	2	6
14	Drawing Stop Valve	1	3	2	6
15	Drawing Air cock valve	1	3	2	6
Total Number of Hours		15	45	30	90

Computer Laboratory (CAD software) Activities:

Experiment Title	Hours
Introduction to software	2
2D Sketches and 3D Features (1)	3
2D Sketches and 3D Features (2)	3
Sketched Secondary Features (1)	3
Sketched Secondary Features (2)	3
Assembly Principles	2
Assembly Tools (1)	2
Assembly Tools (2)	2
Creating Working and Construction Drawings	4
Creating Motion and Video	2
Project Coordination (1)	2
Project Coordination (2)	2
Total Hours	**30**

10. Course Content / LOs Matrix

No.	Course Content	1	2	3	4
1	Introduction	√	√		
2	Drawing Fasteners	√			
3	Introduction to Couplings	√	√	√	
4	Drawing Rigid couplings	√	√	√	√
5	Drawing Transmission Shafts	√	√	√	√
6	Drawing Flexible Couplings	√	√	√	
7	Drawing Pulleys Brackets	√	√	√	√
8	Drawing Power Screws	√	√	√	√
9	Drawing Machine Vice	√	√	√	
10	Drawing Pipe Vice	√	√	√	
11	Drawing Screw Jacks	√	√	√	√
12	Drawing Safety Valve	√	√	√	
13	Drawing Non-return valve	√	√	√	√
14	Drawing Stop Valve	√	√	√	
15	Drawing Air cock valve	√	√	√	√

11. Assessment Methods / LOs Matrix

Assessment	1	2	3	4
Assignments and reports	√	√	√	√
Pop-Quizzes	√		√	

Laboratory activities		√	√	√
Mid-Term	√		√	√
Final Exam	√		√	√

12. Learning Method / LOs Matrix

Learning Method	1	2	3	4
Lecture	√	√	√	√
Tutorial	√	√	√	√
Laboratory		√	√	√

Course Specification

1. Basic Information

<table>
<tr><td colspan="3">MDP112</td><td colspan="7">Machine Construction</td><td colspan="2">3 CH</td></tr>
<tr><td colspan="3">Prerequisites</td><td colspan="9">Mechanical Engineering Drawing</td></tr>
<tr><td colspan="12">Number of weekly Contact Hours</td></tr>
<tr><td colspan="4">Lecture</td><td colspan="4">Tutorial</td><td colspan="4">Laboratory</td></tr>
<tr><td colspan="4">2</td><td colspan="4">2</td><td colspan="4">0</td></tr>
<tr><td colspan="3">Required SWL</td><td colspan="3">125</td><td colspan="3">Equivalent ECTS</td><td colspan="3">5</td></tr>
<tr><td colspan="12">Course Content</td></tr>
<tr><td colspan="12">Loading Diagrams, General concepts of Stress and Strain, Types of Stresses (Normal Stresses and Shear Stresses), Combined Stresses, Theories of Elastic Failure, Safety Factor.
Constructional details as affected by manufacturing, assembly, and strength considerations, Connections (Centring, Flanged, Riveted, Keyed, Splined, Screwed), Power Screw and its joints, Seals, Springs, Stress Concentrations, Reverse Engineering.</td></tr>
<tr><td colspan="12">Used in Program / Level</td></tr>
<tr><td colspan="8">Program Name or requirement</td><td colspan="4">Study Level</td></tr>
<tr><td colspan="8">Mechanical Engineering Requirement</td><td colspan="4">2</td></tr>
<tr><td colspan="8">Manufacturing Engineering Program</td><td colspan="4">2</td></tr>
<tr><td colspan="8">Energy and Renewable Energy Engineering Program</td><td colspan="4">2</td></tr>
<tr><td colspan="12">Assessment Criteria</td></tr>
<tr><td colspan="3">Student Activities</td><td colspan="3">Mid-Term Exam</td><td colspan="3">Practical Exam</td><td colspan="3">Final Exam</td></tr>
<tr><td colspan="3">25%</td><td colspan="3">25%</td><td colspan="3">0%</td><td colspan="3">50%</td></tr>
</table>

2. Course Aims

This course aims to:

- Understand the elastic behavior of simple element under different types of loading.
- Draw the different kind of loading distributions along the part length
- Differentiate between the normal, shear stresses and the resulted strain.
- Use the theories of elastic failure in designing various items.
- Realize the constructional details required to design different parts.
- Use different international standards in designing various items.
- Select the proper kind of connection(s) between the assembled parts to achieve the maximum performance of the assembly in the field of operation (working condition)
- Understand the effect of stress concentration on the selection of design parameters (load – material – size – safety factor) of a part.
- Study the principles of reverse engineering.

3. Learning Outcomes (LOs)

Cognitive Domain	
1	Select the proper kind of connection(s) between the assembled parts to achieve the maximum performance of the assembly in the field of operation (working condition).
2	Apply the principles of reverse engineering as possible in designing a new project.
Psychomotor Domain	
3	Distinguish between various types of stresses affecting any part under loading according to the theory of elastic failure in designing a part under static loading.
4	Sketch workshop drawings for a part and construction drawings for the assembled parts.
Affective Domaine	
5	Work in teams in at design projects.
6	Follow design report scientific standards guideline the.

4. Course LOs Mapping with Level of Competencies

LOs	Competences		
	B1$_m$	**B2$_m$**	**B4$_m$**
Cognitive Domain			
1	●	●	●
2	●	●	●
3	●	●	
4		●	●
Affective Domaine			
5	●	●	●
6			●

5. Assessment and Feedback Strategy

- Assignments and project reports (online & written)
- Quizzes (online & written)
- Written examinations (midterm & final term)

6. Teaching and Learning Methods

- Lectures (online using Microsoft Teams platform)
- Tutorial (on campus & online using Microsoft Teams platform)

7. List of References

a. Essential books (textbooks)

- R.S. Khurmi, J. K. Gupta, "A Textbook of Machine Design", 13th Edition, Publishing House (Pvt.) LTD., 2004.
- R. K. Rajput, " Strength of Materials ", 4th Edition, S. Chand & Company LTD, 2009.
- Ammar Grous, " Applied Mechanical Design ", 1st Edition, Wiley, 2018. (EKB) https://0810e73i0-1106-y-https-onlinelibrary-wiley-com.mplbci.ekb.eg/doi/book/10.1002/9781119137658

b. Recommended books

- DR. H. J. Shah, S. B. Junnarkar, " Mechanics of Structures", 5th Edition, Charotar Publishing House, 2005.
- Ferdinand P. Beer, E. Russell Johnston, Jr. John T. Dewolf, " Mechanics of Materials ", 4th Edition, Mc Graw Hill, 2006. (EKB)
- Gitin M Maitra, L V Prasad, "Handbook of Mechanical Design ", 2nd Edition, Tata Mc Graw-Hill Publishing Company Limited, 2006.
- Richard G. Budynas, J. Keith Nisbett, "Shigley's Mechanical Engineering Design", 19th Edition, Mc Graw Hill, 2011. (EKB)

8. Study Plan

No.	Course Content	Lect.	Tut.	Total
1	Principles of statics and its application on deformable bodies.	2	2	4
2	Loading Diagrams	2	2	4
3	Stress and Strain	2	2	4
4	Normal Stresses	2	2	4
5	Shear Stresses	2	2	4
6	Combined stresses	2	2	4
7	Theories of Elastic Failure	2	2	4
8	Safety Factor	2	2	4
9	Construction Details	6	6	12
10	Connections	4	4	8
11	Power Screw	2	2	4
12	Stress Concentration	2	2	4
13	Reverse Engineering	2	2	4
Total Number of Hours		30	30	60

9. Course Content / LOs Matrix

Topic	Course Content	1	2	3	4	5	6
1	Principles of statics and its application on deformable bodies.			●			
2	Loading Diagrams			●			
3	Stress and Strain			●			
4	Normal Stresses			●			
5	Shear Stresses			●			
6	Combined stresses			●			
7	Theories of Elastic Failure			●			
8	Safety Factor					●	●
9	Construction Details	●			●	●	
10	Connections	●			●	●	
11	Power Screw			●			
12	Stress Concentration			●			
13	Reverse Engineering		●			●	

10. Assessment and Feedback Strategies / LOs Matrix

Assessment Method	1	2	3	4	5	6
Assignments and reports	●	●	●	●	●	●
Quizzes	●		●	●		
Mid-Term	●		●	●		
Final Exam	●		●	●		

11. Teaching & Learning Methods / LOs Matrix

Learning Method	1	2	3	4	5	6
Lecture	●		●	●	●	
Tutorial	●		●	●	●	●
Self-learning	●	●	●	●	●	

Course Specification

1. Basic Information

<table>
<tr><td>MDP211</td><td colspan="3">Machine Elements Design</td><td>4 CH</td></tr>
<tr><td>Prerequisites</td><td colspan="4">Machine Construction</td></tr>
<tr><td colspan="5">Number of weekly Contact Hours</td></tr>
<tr><td colspan="2">Lecture</td><td colspan="2">Tutorial</td><td>Laboratory</td></tr>
<tr><td colspan="2">3</td><td colspan="2">2</td><td>2</td></tr>
<tr><td>Required SWL</td><td>200</td><td colspan="2">Equivalent ECTS</td><td>8</td></tr>
<tr><td colspan="5">Course Content</td></tr>
<tr><td colspan="5">Introduction to Design Concepts, General Concepts of (Deflection, Buckling and Thermal Stresses), Design for Fatigue, Design of Machine Elements (Bolts, Power Screws, Rivets, Keys, Welded Joints, Springs), Design of Power Transmission Elements (Shafts, Couplings, Gears, Belt Drives, Chain Drives), Selection of Bearings, Design of Pressure Cylinders. Use of interactive Finite Element computer programs for problem solving is illustrated and used.</td></tr>
<tr><td colspan="5">Used in Program / Level</td></tr>
<tr><td colspan="3">Program Name or requirement</td><td colspan="2">Study Level</td></tr>
<tr><td colspan="3">Mechanical Engineering Requirement</td><td colspan="2">2</td></tr>
<tr><td colspan="3">Manufacturing Engineering Program</td><td colspan="2">2</td></tr>
<tr><td colspan="3">Energy and Renewable Energy Engineering Program</td><td colspan="2">4</td></tr>
<tr><td colspan="5">Assessment Criteria</td></tr>
<tr><td>Student Activities</td><td>Mid-Term Exam</td><td colspan="2">Practical Exams</td><td>Final Exam</td></tr>
<tr><td>40%</td><td>20%</td><td colspan="2">0%</td><td>40%</td></tr>
</table>

2. Course Aims

This course aims to:

- Differentiate between the deflection and buckling for beams.
- Evaluate the thermal stresses in items.
- Design various items under fatigue loading.
- Realize the constructional details required to design different machine elements & power transmission elements.
- Use different international standards in selection various items like bearings, belts, chain, etc.
- Design different power transmission elements like gears, couplings, etc.
- Design machine elements like bolts, power screw, rivets, keys, welded joints, etc.
- Use interactive Finite Element computer programs for problem solving.

3. Intended Learning Outcomes (ILOs)

a.	Knowledge and understanding
a1	List the different theories used in designing items under dynamic loading
a2	Name the field of applications for different machine elements.
a3	Distinguishes the constructional details required to design different machine elements & power transmission elements.
a4	Identify the suitable conditions required for using each power transmission elements.
b.	Intellectual skills
b1	Select various items like bearings, belts, chain, etc.
b2	Analyze the different kind of stresses induced in each machine elements & power transmission elements.
b3	Outline the most suitable gearbox to achieve the customer needs
c.	Professional and practice skills
c1	Compute all kinds of stresses induced in machine elements & power transmission elements under loading.
c2	Diagram the different kind of stresses induced in machine elements & power transmission elements under loading.
c3	Use different international standards in designing a part.
c4	Design a workshop drawing for a part and construction drawings for the assembled parts.
c5	Use interactive Finite Element computer programs for problem solving.
d.	General and transferable skills
d1	Refer to relevant literatures.
d2	Work as a part of a team in different projects.
d3	Manage tasks, time, and resources effectively.
d4	Develop the creative thinking and problem-solving skills.
d5	Present a design report according to the scientific standards guideline.

4. Assessment and Feedback Strategy

- Assignments and project reports (online & written)
- Quizzes (online & written)
- Written examinations (midterm & final term)

5. Teaching and Learning Methods

- Lectures (online using Microsoft Teams platform)
- Tutorial (on campus & online using Microsoft Teams platform)

6. List of References

a. Essential books (textbooks)

- R.S. Khurmi, J. K. Gupta, "A Textbook of Machine Design", 13th Edition, Publishing House (Pvt.) LTD., 2004.
- R. K. Rajput, " Strength of Materials ", 4th Edition, S. Chand & Company LTD, 2009.
- Ammar Grous, " Applied Mechanical Design ", 1st Edition, Wiley, 2018. (EKB) https://0810e73i0-1106-y-https-onlinelibrary-wiley-com.mplbci.ekb.eg/doi/book/10.1002/9781119137658

b. Recommended books

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- Ferdinand P. Beer, E. Russell Johnston, Jr. John T. Dewolf, " Mechanics of Materials ", 4th Edition, Mc Graw Hill, 2006. (EKB)
- Gitin M Maitra, L V Prasad, "Handbook of Mechanical Design ", 2nd Edition, Tata Mc Graw-Hill Publishing Company Limited, 2006.
- Richard G. Budynas, J. Keith Nisbett, "Shigley's Mechanical Engineering Design", 19th Edition, Mc Graw Hill, 2011. (EKB).

7. ILOs Mapping with Level of Competencies

ILOs	Level of Competences					
	B1	**B2**	**B4**			
a. Knowledge and understanding						
a1	√					
a2	√					
a3	√					
a4	√		√			
b. Intellectual skills						
b1	√	√				
b2	√	√				
b3	√	√				
c. Professional and practice skills						
c1		√				
c2		√				
c3		√	√			
c4		√	√			
c5		√	√			
d. General and transferable skills						
d1	√					
d2		√	√			
d3		√	√			
d4	√					
d5		√	√			

8. Study Plan

No.	Course Content	Lect.	Tut.	Lab	Total
1	Deflection	2	2	2	6
2	Buckling	2	2	2	6
3	Thermal Stresses	2	2	2	6
4	Design under Fatigue Loading	2	2	2	6
5	Machine Elements Design	8	8	8	24
6	Rolling Bearings	4	4	4	12
7	Power Transmission Elements Design	8	8	8	24
8	Gearboxes Construction	2	2	2	6
Total Number of Hours		30	30	30	90

List of Experiments

	Duration	Description
Design of bolted connections	Week (1-2)	• Bolts types • External Loads calculations • Tightening torque and prestress • Safety factors • Bolts and joints stiffness • Pressure vessel application
Design of power screws	Week (3)	• Tightening torque • Stresses on power screws • Pipe vice application
Design of brackets	Week (4-5)	• Finite Element Method Concepts • Mesh settings • Supports • Material definition • Load application • Stress distribution • Stress analysis application
Design of power transmission shafts	Week (6-7)	• Practicing on modeling the power transmission shafts using the design accelerator module available on Autodesk Inventor. • Generate full detailed report covering all calculations related to power transmission shafts

Design of gears and bearings	Week (8-9)	• Gear generation, types of gears, standards, force analysis. • Generate full detailed report covering all calculations related to gears.
		• Practicing on assembly of different components used on power transmission units. • Gear unit application.
Design of belts	Week (10)	• Types of belts • Theory of power transmitted via belts • Standards of belts • Belts geometry • Loads and stresses • Belts assembly
Project	**3 Weeks**	**Project to practice the design of each element studied through the lab.**

9. Course Content / ILO Matrix

No.	Course Content	a				b			c					d				
		1	2	3	4	1	2	3	1	2	3	4	5	1	2	3	4	5
1	Deflection						√		√	√			√	√	√	√	√	√
2	Buckling						√		√	√			√	√	√	√	√	√
3	Thermal Stresses						√		√	√			√	√	√	√	√	√
4	Design under Fatigue Loading	√					√		√	√			√	√	√	√	√	√
5	Machine Elements Design		√	√		√	√		√	√	√	√	√	√	√	√	√	√
6	Rolling Bearings		√	√	√	√	√		√	√	√	√	√	√	√	√	√	√
7	Power Transmission Elements Design			√	√	√	√		√	√	√	√	√	√	√	√	√	√
8	Gearboxes Construction			√	√			√			√	√	√	√	√	√	√	√

10. Assessment Methods / ILO Matrix

No.	Assessment Method	a				b			c					d				
		1	2	3	4	1	2	3	1	2	3	4	5	1	2	3	4	5
1	Assignments and reports	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
2	Quizzes		√	√		√	√		√	√	√	√	√					
3	Mid-Term		√	√		√	√		√	√	√	√	√					
4	Final Exam		√	√		√	√		√	√	√	√	√					

11. Learning Method / ILO Matrix

No.	Learning Method	a				b			c					d				
		1	2	3	4	1	2	3	1	2	3	4	5	1	2	3	4	5
1	Lecture	√	√	√	√	√	√	√	√	√	√	√	√			√	√	
2	Tutorial	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
3	Lab	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√

Course Specification

1. Basic Information

MDP212	Mechanics of Machines	4 CH
Prerequisites	Engineering Drawing	

Number of weekly Contact Hours

Lecture	Tutorial	Laboratory
3	3	1

Required SWL	150	Equivalent ECTS	6

Course Content

According to Bylaw 2018:

Mechanisms: Definitions, open-chain systems, closed-chain systems constraints, degrees of freedom, reference frames, inversions of four linkage (lower pair) mechanisms, slotted lever mechanism, steering mechanisms, inversions of mechanisms, Hook's joint, and synthesis of mechanisms.

Kinematics: Kinematics of rigid bodies, position analysis, velocity analysis, acceleration analysis, rotation representations, Euler angles, rotation matrix, homogeneous transformation matrix, direct and inverse kinematics.

Dynamics: Equilibrium of machines, D'Alembert's principle, force analysis, power analysis, Friction and inertia-effects, center of percussion, flywheel design.

Kinetics of single degree of freedom mechanisms: Free body diagrams, Static equilibrium, Equation of motion.

Cams: Types of cams, types of followers, kinematics and kinetics of cam.

Gears: Concept of gear motion transmission, gear geometry and gear trains.

Used in Program / Level

Program Name or requirement	Study Level
Design and Production Engineering Program	3
Mechanical Power Engineering Program	3
Automotive Engineering Program	3
Mechatronics Engineering Program	3

Assessment Criteria

Student Activities	Mid-Term Exam	Practical Exam	Final Exam
25%	15%	0%	60%
Exam Duration [Hours]	2		3

Equivalent to other course in another university

2. Course Aims

This course aims are to provide students with deep knowledge of the fundamental principles, design and operation of mechanical machines and mechanisms and understanding of the basic mechanisms used in machines and their performance. Also, to provide the ability to design simple common mechanisms and to perform kinematic and dynamic analysis of any mechanism.

3. Program Competencies Served by Course.

A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.

A3. Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.

B1m. Model, analyze and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations.

B2m. Carry out designs of mechanical systems and machine elements using appropriate materials both traditional means and computer-aided tools and software contemporary to the mechanical engineering field.

4. Learning Outcomes (LOs)

Cognitive Domain	
1	Recognize the fundamental concepts of: "Kinematic chain"," link, joints, open kinematics chain, closed kinematics chain
2	Recognize the functions and inversions of the frequently used mechanisms, (slider crank, double slider, four-bar, etc.).
Psychomotor Domain	
3	Design simple mechanisms, Cam, flywheel and gear units.
4	Practice using some software to describe kinematic and kinetics of mechanisms to examine the design performance.
Affective Domain	
5	Evaluate the mechanism performance and design based on kinematic and kinetic analysis

.

5. Course LOs Mapping with Level of Competencies

LOs	Level of Competences			
	A1	**A3**	**B1m**	**B2m**
Cognitive Domain				
1	√	√		√
2	√	√		√
Psychomotor Domain				
3			√	
4				√
Affective Domain				
5	√	√	√	

6. Assessment and Feedback Strategy

- Assignments.
- Quizzes.
- Oral examination for lab activities.
- Midterm
- Final exam).
- Lab reports.

7. Teaching and Learning Methods

- Online interactive Lectures
- Face to face lectures
- Online interactive tutorials
- Face to face tutorials
- Laboratory
- Case study

8. List of References

Essential books (textbooks)

1. Rattan, S. S., 2014. Theory of Machines. 4 ed. s.l.: McGraw-Hill Education (India) Private.
2. Norton, R. L., 2012. Design of Machinery: An Introduction to the Synthesis and Analysis of Mechanisms and Machines. 5 ed. s.l.: McGraw-Hill Higher Education.

Recommended books

1. R. S. Khurmi, J. K. G., 2005. Theory of Machines. 14 ed. s.l.: S Chand & Co Ltd.
2. Rao, J. S., 2007. The Theory of Machines Through Solved Problems. s.l.: New Age International.
3. John Joseph Uicker, A. P. (2003). Theory of Machines and Mechanisms. Oxford University Press.
4. M.Z. Kolovsky, A. E. Y. S. A. S., 2012. Advanced Theory of Mechanisms and Machines. s.l.: Springer Science & Business Media. **(https://www.ekb.eg)**

9. Study Plan

Week	Course Content	Lecture Hours	Tutorial Hours
1	Introduction, definition, and Basics of mechanisms, Degrees of freedom, Types of mechanisms	**3**	**3**
2	Inversions of reciprocating engine, Inversions of double slider mechanism	**3**	**3**
3	Motor vehicle steering mechanism, Hook's joint.	**3**	**3**
4	Synthesis of mechanisms	**3**	**3**
5	Position analysis	**3**	**3**
6	Velocity analysis	**3**	**3**
7	Acceleration analysis	**3**	**3**
8,9	Force analysis	**6**	**6**

10	Flywheel	**3**	**3**
11	Cam analysis	**3**	**3**
12	Kinematic gear analysis	**3**	**3**
13,14	Representations, Euler angles, rotation matrix, homogeneous transformation matrix	**6**	**6**
15	Direct and inverse kinematics.	**3**	**3**
Total Number of Hours		**45**	**45**

No.	Week	Title of Experiment	Laboratory Hours
1	1-3	Construction	3
2	4-5	Position Analysis	2
3	6-9	Velocity and Acceleration Analysis	4
4	10-13	Force Analysis	4
5	14-15	Gear Dynamics Analysis	2
		Total Number of Hours	**15**

10. Course Content / LOs Matrix

No.	Course Content	1	2	3	4	5
1	Introduction, definition, and Basics of mechanisms, Degrees of freedom, Types of mechanisms	√	√		√	
2	Inversions of reciprocating engine, Inversions of double slider mechanism	√	√		√	
3	Motor vehicle steering mechanism, Hook's joint.	√	√		√	
4	Synthesis of mechanisms		√	√	√	
5	Position analysis			√	√	√
6	Velocity analysis			√	√	√
7	Acceleration analysis			√	√	√
8	Force analysis			√	√	√
9	Flywheel			√	√	√
10	Cam analysis			√	√	√
11	Kinematic gear analysis	√		√	√	√
12	Representations, Euler angles, rotation matrix, homogeneous transformation matrix	√			√	√
13	Direct and inverse kinematics.			√	√	

11. Teaching & Learning Methods / LOs Matrix

Assessment	1	2	3	4	5
Assignments	√	√	√		√
Quizzes	√	√	√		√
Oral examination for lab activities	√	√		√	√
Midterm	√	√	√		√
Final exam	√	√	√		√

12. Learning Method / LOs Matrix

Learning Method	1	2	3	4	5
Lectures	√	√	√		√
Tutorial	√	√	√		√
Laboratory	√	√	√	√	√

Course Specification

1. Basic Information

MDP311	Mechanical Vibrations	4 CH
Prerequisites	Rigid Body Dynamics	

Number of weekly Contact Hours		
Lecture	Tutorial	Laboratory
3	2	1

Required SWL	175	Equivalent ECTS	7

Course Content
Introduction, Vibration of single degree of freedom systems (free, damped, forced), Vibration isolation, Vibration of two degree of freedom systems (free, forced), Vibration absorber, Torsional vibrations (free, forced), Equivalent torsional systems: Geared system, Crank system, Multi-degree-of-freedom systems, Continuous systems: bending of shafts, analytical solution, balancing of rotary mass, Whirling of shafts, Vibration measurements.

Used in Program / Level	
Program Name or requirement	Study Level
Design and Production Engineering Program	3
Mechanical Power Engineering Program	3
Automotive Engineering Program	3
Mechatronics Engineering Program	3

Assessment Criteria			
Student Activities	Mid-Term Exam	Practical Exam	Final Exam
25%	15%	0%	60%
Exam Duration [Hours]	1		3

Equivalent to other course in another university	
University	
Course code and title	

2. Course Aims

The aim of this course is to introduce the fundamentals of mechanical vibrations to mechanical engineering students and provide them with opportunity of analyzing mechanical systems undergoing vibratory motions.

3. Program Competencies Served by Course.

A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.

A2. Develop and conduct appropriate experimentation and/or simulation, analyse and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.

A3. Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.

B1m. Model, analyse and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations.

B4m. Adopt suitable national and international standards and codes to design, build, operate, inspect and maintain mechanical equipment and systems.

4. Learning Outcomes - LOs

Cognitive Domain	
1	Quantify mechanical vibrations using appropriate physical quantities.
2	Apply the basics of Mechanical Vibrations in Mechanical Design.
Psychomotor Domain	
3	Measure the physical quantities of mechanical systems undergoing oscillatory motions and use experimental measurements to control vibrations.
Affective Domain	
4	Beware of the problems resulting from mechanical vibrations and seek solutions.

5. Course LOs Mapping with Level of Competencies

ILOs	Level of Competences				
	A1	A2	A3	B1m	B4m
Cognitive Domain					
1	✓		✓	✓	✓
2	✓		✓	✓	✓
Psychomotor Domain					
3		✓		✓	✓
Affective Domain					
4					✓

6. Assessment and Feedback Strategy

- Assignments 5%
- Lab reports 10%
- Quizzes 10%
- Midterm 15%
- Final 60%

7. Teaching and Learning Methods

- Online interactive Lectures
- Face to face lectures
- Online interactive tutorials
- Face to face tutorials

8. List of References

8-1 Course notes

-Mohamed T. Hedaya, "Mechanical Vibration", 2008.

8-2 Essential books (text books)

-Singiresu S. Rao, "Mechanical Vibrations", Pearson, 2011.

-William T. Thomson, "Theory of Vibration with Applications", CRC Press, 1996.

8-3- Recommended books

-Daniel J. Inman, "Engineering Vibration", Prentice Hall, 2001.

-Leonard Meirovitch, "Elements of Vibration Analysis", McGraw-Hill, 2008.

9. Study Plan

No.	Course Content	Lecture Hours	Tutorial Hours	Lab Hours
1	Introduction	6	4	1
2	Free Vibration of Undamped Single Degree of Freedom Systems	3	2	2
3	Free Vibration of Damped Single Degree of Freedom Systems	6	4	4
4	Harmonically Excited Vibration of Single Degree of Freedom Systems	9	6	4
5	Vibration of Undamped Two-Degree of Freedom Systems: Free vibrations	9	6	2
6	Vibration of Undamped Multi-Degree of Freedom	3	2	
7	Free Lateral Vibration of Beams and Critical Speeds of Rotating Shafts: Beam vibrations	3	2	2
8	Free Lateral Vibration of Beams and Critical Speeds of Rotating Shafts: Whirling of shafts	3	2	
9	Balancing of Shafts	3	2	
Total Number of Hours		45	30	15

No	Title of Experiment	Laboratory Hours
1	Vibration measurements systems	1
2	Natural Frequency Measurement	2

3	Free-damped vibrations	4
4	Forced vibrations	2
5	Transmissibility	2
6	Two degree of freedom systems	2
7	Beam vibrations	2
	Total Number of Hours	15

10. Course Content / LOs Matrix

No	Course Content	1	2	3	4
1	Introduction	✓		✓	✓
2	Free Vibration of Undamped Single Degree of Freedom Systems	✓		✓	
3	Free Vibration of Damped Single Degree of Freedom Systems	✓		✓	✓
4	Harmonically Excited Vibration of Single Degree of Freedom Systems	✓	✓	✓	✓
5	Vibration of Undamped Two-Degree of Freedom Systems: Free vibrations	✓	✓	✓	✓
6	Vibration of Undamped Multi-Degree of Freedom	✓	✓		✓
7	Free Lateral Vibration of Beams and Critical Speeds of Rotating Shafts: Beam vibrations	✓	✓	✓	✓
8	Free Lateral Vibration of Beams and Critical Speeds of Rotating Shafts: Whirling of shafts	✓	✓		✓
9	Balancing of Shafts	✓	✓		✓

11. Assessment and Feedback Strategies / LOs Matrix

Assessment	1	2	3	4
Assignments	✓	✓		✓
Lab reports	✓		✓	
Quizzes	✓	✓		✓
Mid-Term Exam	✓	✓	✓	✓
Final Exam	✓	✓	✓	✓

12. Teaching & Learning Methods / LOs Matrix

Learning Method	1	2	3	4
Lectures	✓	✓	✓	✓
Tutorials	✓	✓		✓
Labs	✓		✓	

Course Specification

1. Basic Information

<table>
<tr><td>MDP 152</td><td colspan="3">Metallurgy & Materials Testing</td><td>3 CH</td></tr>
<tr><td>Prerequisites</td><td colspan="4">MDP 151 Structure and properties of materials</td></tr>
<tr><td colspan="5">Number of weekly Contact Hours 5</td></tr>
<tr><td colspan="2">Lecture</td><td>Tutorial</td><td colspan="2">Laboratory</td></tr>
<tr><td colspan="2">3</td><td>1</td><td colspan="2">1</td></tr>
<tr><td>Required SWL</td><td>100</td><td>Equivalent ECTS</td><td colspan="2">5</td></tr>
<tr><td colspan="5">Course Content</td></tr>
<tr><td colspan="5">This course provides a general treatment of the principles and problems of engineering materials and testing with specific reference to the mechanical properties. It also covers the common methods of static and dynamic testing: tension, compression, bending, shear, hardness, impact, creep and fatigue. Other topics are also included namely the types of fracture and the non-destructive testing of materials.</td></tr>
<tr><td colspan="5">Used in Program / Level</td></tr>
<tr><td colspan="3">Program Name or requirement</td><td colspan="2">Study Level</td></tr>
<tr><td colspan="3">Design and Production Engineering Program.</td><td colspan="2">Sophomore</td></tr>
<tr><td colspan="3">Mechanical Power Engineering Program</td><td colspan="2">Sophomore</td></tr>
<tr><td colspan="3">Mechatronics Engineering Program</td><td colspan="2">Sophomore</td></tr>
<tr><td colspan="3">Automotive Engineering Program</td><td colspan="2">Sophomore</td></tr>
<tr><td colspan="3">Manufacturing Engineering Program</td><td colspan="2">Sophomore</td></tr>
<tr><td colspan="5">Assessment Criteria</td></tr>
<tr><td>Student Activities</td><td>Mid-Term Exam</td><td>Practical Exam</td><td colspan="2">Final Exam</td></tr>
<tr><td>10%</td><td>10%</td><td>20%</td><td colspan="2">60%</td></tr>
<tr><td>Exam Duration [Hours]</td><td>2</td><td></td><td colspan="2"></td></tr>
<tr><td colspan="5">Equivalent to other course in another university</td></tr>
<tr><td>University</td><td colspan="4">Faculty requirement</td></tr>
<tr><td>Course code and title</td><td colspan="4"></td></tr>
</table>

2. Course Aims

Students successfully completing MDP 152 will gain the following

- A basic view of the importance of standardization, mechanical testing and inspections
- A qualitative view of the elastic, plastic and fracture features of different materials
- Practical ability to perform different mechanical testing to determine material properties
- Realize the relation between Metallurgy features and properties of materials
- Assess the properties of materials under different types of loading
- A deep knowledge about different kind of loading & service conditions

3. Program Competencies Served by Course:

A: Faculty Requirements

A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.

A5. Practice research techniques and methods of investigation as an inherent part of learning.

D: Inter-Disciplinary

D2 . Model, Analyze and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations.

D8. Adopt suitable national and international standards and codes to: design, build, operate, inspect and maintain industrial equipment and systems

4. Learning Outcomes (Los)

Cognitive Domain	
1	Recognizes terminologies and definitions related to properties of materials under different loading and condition.
2	Solves the mechanical behavior problems under different loading. [Applying]
3	Relates the plastic deformation mechanism with the strengthening and toughening methods. [Analyzing]
Psychomotor Domain	
4	Proceeds different mechanical tests on different solid materials according to appropriate sample's dimension and testing procedure standards.
Affective Domain	
5	Discuss different materials testing results and their type of failure

5. Course LOs Mapping with Level of Competencies

5-Specialized programs

a. Design and Production Engineering Program
b. Mechanical Power Engineering Program
c. Automotive Engineering Program
d. Mechatronics Engineering Program
e. Manufacturing Engineering Program

LOs	Competences			
	A2	A5	D2	D8
Cognitive Domain				
1	●			●
2	●	●	●	●
3			●	
Psychomotor Domaine				
4	●			●
Affective Domaine				
5		●		●

6. Assessment and Feedback Strategy

- Assignments
- Lab reports
- Quizzes
- Oral examination for lab activities
- Project
- Written examinations (midterm & final term)

7. Teaching and Learning Methods

- Lectures
- Tutorials
- Practical
- Self-learning
- Project based learning

8. List of References

a. **Course notes**
-Developed by course instructors and sent to all students via LMS

b. **Essential books (text books)**
W. D. Callister, **Materials Science and Engineering**, 8th edition, Wiley, 2015.

a. **Recommended books**

- **Mechanical Behavior and Testing of Materials**, Bhargava A.K, ISBN-10: 812034250X, Prentice Hall India Learning Private Limited, 2016
- **Mechanical Testing of Metallic Materials**, Er. Chinmaya Mohapatra B.E, ISBN-10: 1727332938, CreateSpace Independent Publishing Platform; 2 E, 2018
- M. F. Ashby and D. R. H. Jones, **Engineering Materials II**: An Introduction to Microstructures, Processing, and Design, 3rd edition, 2015.

b. **Web sites**
www.mmat.ubc.ca , www.materials.eng.cam.ac.uk , www.matweb.com , www.info.com
http://ocw.mit.edu/OcwWeb/ , http://www.eulc.edu.eg/ , http://www.doitpoms.ac.uk/

9. Study Plan

Week	Course Content	Lecture Hours	Lab Hours	Tutorial Hours
1	Introduction to Materials Testing	3	2	---
2	Standardization & Deformation Systems	3	---	2

3	Mechanical Properties & Tension Test I	3	---	2
4	Tension Test II	3	2	1
5	Compression Test	3	2	---
6	Bending Test	3	2	
7	Hardness Test	3	2	---
8	Mid Term	3	---	2
9	Shear Test & Torsion Test	3	2	---
10	Strengthening Mechanisms	3	---	2
11	Impact Test	3	2	---
12	Fatigue Test	3	2	---
13	Creep Test	3	2	---
14	Non-Destructive Tests	3	1	---
15	General Revision	3	--	2
Total Number of Hours		**45**	**15**	**15**

Week	Title of Experiment	Laboratory Hours
1	Introduction to Materials Testing	**2**
2	Standardization & Deformation Systems	**2**
3	Mechanical Properties & Tension Test I	**2**
4	Tension Test II	**2**
5	Compression Test	**2**
6	Bending Test	**2**
7	Hardness Test	**2**
8	Mid Term	**2**
9	Shear Test & Torsion Test	**2**
10	Strengthening Mechanisms	**2**
11	Impact Test	**2**
12	Fatigue Test	**2**
13	Creep Test	**2**
14	Non-Destructive Tests	**2**
15	Oral & Practical Exam	**2**
Total Number of Hours		**30**

10.Course Content / LOs Matrix

Topic	Course Content	1	2	3	4	5
1	Introduction to Materials Testing	●				
2	Standardization & Deformation Systems	●	●	●		●
3	Mechanical Properties & Tension Test I	●	●		●	
4	Tension Test II	●	●		●	
5	Compression Test	●	●		●	
6	Bending Test	●	●		●	

7	Hardness Test	●	●		●	
8	Shear Test & Torsion Test	●	●		●	
9	Strengthening Mechanisms	●	●	●	●	●
10	Impact Test	●	●		●	
11	Fatigue Test	●	●		●	
12	Creep Test	●	●		●	
13	Non-Destructive Tests	●			●	

11.Assessment & Feedback Strategies / LOs Matrix

Assessment	1	2	3	4	5
Assignments	●	●			●
Projects	●				●
Quizzes (weeks 6 and 12)		●			
Mid-Term Exam	●	●	●		
Practical Exam	●			●	●
Final Exam	●	●	●		

Instructors: **Prof. Dr. Adel El-Shabasy**
Dr. Talaat El-Benawy
Prof. Dr. Ahmed Moneeb

Course Specification

- Basic Information

MDP181	Manufacturing Technologies		3 CH
Prerequisites	Production Engineering		
Number of weekly Contact Hours			
Lecture	Tutorial	Laboratory	
3	0	2	
Required SWL	125	Equivalent ECTS	5
Course Content			
Machining: Principles of machining, Turning machines and processes, Drilling machines and processes, Shaping and planning machines and processes, Milling machines and processes, Methods of tools and work piece fixation, Machining time, Introduction to Non-conventional machining processes. Forming: Introduction includes mechanical behaviour of the materials, Plastic deformation, Effect of temperature on plastic behaviour, Types of forming processes: Hot, Cold, Massive or sheet metal work, Metal forming processes: Forging and its types, Rolling, Extrusion, Types of drawing (rod, wire, tube, and deep), Sheet metal work (shearing, pressing, blanking, spinning, bending, coining, etc.), Brief explanation to forming machines and equipment.			
Used in Program / Level			
Program Name or requirement	Study Level		
Mechanical Engineering Requirement	2		
Mechanical Engineering Requirement			
Student Activities	Mid-Term Exam	Practical Exam	Final Exam
20%	25%	15%	40%

Course Aims

The aim of this course is to provide students with by background necessary to:

- Demonstrate understanding of the importance of production engineering.
- Demonstrate understanding of the difference between forming and machining processes.
- Demonstrate understanding of different forming processes.
- Demonstrate understanding of different welding and casting processes.
- Demonstrate understanding of different machining processes.
- Communicate concepts and experimental results in clear and logical fashion, both verbally and in writing.
- Work with manufacturing tools for individual, small group and large group projects.
- Propose suitable technological sequence for different workpieces' shapes.

Intended Learning Outcomes (ILOs)

a.	Knowledge and understanding
a1	Know the fundamental concepts of production technology.
a2	Mention the different forming processes.
a3	Mention the different machining processes.
a4	Identify the different machines used in forming processes
b.	Intellectual skills
b1	Predict the quality of the manufactured product.
b2	Identify the specification of production machine.
b3	Select the appropriate machine for the required product.
b4	Design a suitable production sequence for different products'
c.	Professional and practice skills
c1	Use appropriate manufacturing equipment for different applications.
c2	Perform practical forming experiment
c3	Setup the suitable manufacturing sequence on the selected equipment
c4	Implement a metal cutting process
d.	General and transferable skills
d1	Effectively manage tasks, time, and resources.
d2	Refer to relevant literature and standard
d3	Develop the creative thinking and problem-solving skills.
d4	Work in a team

Assessment and Feedback Strategy

- Assignments
- Quizzes
- Oral examination for lab activities
- Project
- Written examinations (midterm & final term)

Teaching and Learning Methods

- Lectures(50% online using LMS and Microsoft teams and 50% face to face)
- Practical (face to face)
- Self-learning

- Project based learning

- ## List of References
    - S. Kalpakjiam, "Manufacturing Engineering and Technology", 5th Edition, Pearson Prentice Hall, 2006.
- R.K. Jain " Production Technology ", 6th Edition, Khanna Publishers, 2006.

- ILOs Mapping with Level of Competencies

Specialized programs

1- Design and Production Engineering Program
2- Mechanical Power Engineering Program
3- Automotive Engineering Program
4- Mechatronics Engineering Program

ILOs	Level of Competences					
	A2.	A4.	A5.	A6.	B3m.	B4m.
a. Knowledge and understanding						
a1	•					
a2		•				•
a3					•	•
a4	•		•			•
b. Intellectual skills						
b1				•		•
b2	•	•	•			
b3	•				•	•
b4			•		•	•
c. Professional and practice skills						
c1				•		•
c2					•	•
c3		•	•			
c4		•			•	
d. General and transferable skills						
d1		•		•		
d2			•			•
d3				•	•	
d4			•	•		

- Study Plan

Week	Course Content	Lecture Hours	Lab Hours
1	An introduction to metal forming principles and material behaviours.	**3**	**2**
2	Study of hot and cold metal forming process, study of forging processes.	**3**	**2**
3	Study forging process	**3**	**2**
4	Study of rolling machines and rolling operations.	**3**	**2**
5	Extrusion process and extrusion machines.	**3**	**2**
6	Study of drawing processes.	**3**	**2**
7	Sheet metal working and heat treatment	**3**	2
8	Midterm	**3**	2
9	An introduction to machining principles.	**3**	**2**
10	Study of Turning machines.	**3**	**2**
11	Study turning operations.	**3**	**2**
12	Study of Drilling machines and Drilling processes.	**3**	**2**
13	Study of Shaper, Slotter, Planer machines and Shaping, slotting, planning processes.	**3**	**2**
14	Study of Milling machines and Milling processes.	**3**	2
15	Study of Grinding machines and Grinding processes.	**3**	**2**
Total Number of Hours		**45**	30

Week	Title of Experiment	Laboratory Hours
1	Introduction to forming process	**2**
2	Cold and hot working	**2**
3	**upsetting**	**2**
4	**Spring back**	**2**
5	rolling	**2**
6	extrusion	**2**
7	Forging	**2**
8	Mid Term	**2**
9	Turning	**2**
10	**Turning**	**2**
11	Turing machines	**2**
12	Drilling	**2**
13	Shaping	**2**
14	**Milling**	**2**
15	Grinding	**2**
Total Number of Hours		**30**

Course Content / ILO Matrix

Wk	Course Content	a1	a2	a3	a4	b1	b2	b3	b4	c1	c2	c3	c4	d1	d2	d3	d4
1	An introduction to metal forming principles and material behaviours.	*				*								*			
2	Study of hot and cold metal forming process, study of forging processes.	*	*		*	*											
3	Study forging process		*			*		*									
4	Study of rolling machines and rolling operations.		*			*		*									
5	Extrusion process and extrusion machines.		*	*													
6	Study of drawing processes.			*													
7	Sheet metal working and heat treatment				*		*	*		*		*					
8	Midterm																
9	An introduction to machining principles.		*		*		*	*		*	*	*					
10	Study of Turning machines.		*			*	*		*	*	*	*					
11	Study turning operations.		*			*	*	*	*	*	*	*				*	
12	Study of Drilling machines and Drilling processes.	*				*			*		*					*	
13	Study of Shaper, Slotter, Planer machines and Shaping, slotting, planning processes.	*				*			*	*			*				
14	Study of Milling machines and Milling processes.	*				*			*	*	*		*				
15	Study of Grinding machines and Grinding processes.				*			*	*		*		*	*	*	*	*

Assessment Methods / ILO Matrix

Assessment	a1	a2	a3	a4	b1	b2	b3	b4	c1	c2	c3	c4	d1	d2	d3	d4
Assignments	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
Projects			*				*						*	*	*	*
Quizzes	*	*	*	*	*	*	*	*	*	*	*					
Mid-Term Exam	*	*	*	*	*	*	*		*		*					
Practical Exam						*		*	*	*	*	*		*		
Final Exam	*		*		*	*	*	*	*	*	*	*				

Learning Method / ILO Matrix

Learning Method	a1	a2	a3	a4	b1	b2	b3	b4	c1	c2	c3	c4	d1	d2	d3	d4
Lecture	*	*	*	*	*	*	*	*	*	*	*	*				
Practical							*	*					*		*	*
Self-learning													*	*	*	*
Project									*	*			*			*

Course Specification

1. Basic Information

EPM116	Electrical Circuits and Machines	4 CH
Prerequisites	Electricity & Magnetism	
Number of weekly Contact Hours		

Lecture	Tutorial	Laboratory
3	2	1

Required SWL	150	Equivalent ECTS	4

Course Content
Electrical Circuits: Constants and variables of electrical Circuits, elements of electrical circuits, DC circuits, Network theorems, Sinusoidal alternating current circuits at steady state, Phasor diagram representation of sinusoidal quantities, Applications of network theorems on alternating current circuits, Electric power in alternating current circuits, complex power calculations, power factor. Three phase Circuits and systems, Magnetic circuits, Transformers, DC Machines, Synchronous machines, Induction machines.

Used in Program / Level	
Program Name or requirement	Study Level
Mechanical Engineering Requirement	1

Assessment Criteria			
Student Activities	Mid Term Exam	Practical Exam	Final Exam
10%	20%	10%	60%
			2
EPM116	Electrical Circuits and Machines		
Prerequisites	Electricity & Magnetism		

Version: 180730

2. Course Aims

The aim of this course is to provide students with by background necessary to:

- Understand fundamentals of three-phase systems , equipment in power systems such as Transformers, AC and DC machines.
- Apply the fundamental principles *to analyze and diagnose Network theorems* in dc and ac circuits.
- Explore the fundamental principles of transformers and electrical machines.
- Develop skills for analyzing experimental data of electrical circuits and machines.

3. Intended Learning Outcomes (ILOs)

a.	Knowledge and understanding
a1	Identify the fundamental equations to analyze ac and dc circuits.
a2	Explain network theorems applied to both ac and dc circuits.
a3	Describe the steady state equations and equivalent circuits of transformer and dc machine.
a4	Explain theory of operation and steady state analysis of synchronous and induction machines.
b.	Intellectual skills
b1	Categorize electrical circuits based on elements and Classify circuit theorems.
b2	Calculate the volt, current and power in single and 3-phase circuits.
b3	Apply magnetic theory on transformer and dc and ac electrical machines.
b4	Solve problems and Analyze experimental data of transformer, synchronous and induction machines.
c.	Professional and practice skills
c1	Use electrical laboratory devices.
c2	Write practical reports
d.	General and transferable skills
d1	Communicate with others effectively.
d2	Adapt professional Ethics

4. Assessment and Feedback Strategy

4.1 Written exams (mid-term) is done online using Microsoft teams plat form due to corona virus.

4.2 Quizzes are done online using Microsoft teams plat form due to corona virus.

- Assignments (online, written)
- Quizzes (online, written)
- Practical and Oral Exam (face to face, online)
- Mid-Term (face to face, written)
- Final Exam. (face to face, written)

5. Teaching and Learning Methods

Online lectures, tutorials and labs. are done using Microsoft teams application and recorded lectures, tutorials and lab. videos.

- Lectures (including face to face & distance by using Microsoft Teams plat form)
- Tutorials (including face to face & distance by using Microsoft Teams plat form)
- Case studies
- Self-Learning
- Practical (face to face and online)

6. List of References

Charles K. Alexander, Matthew N. O. Sadiku., 'Fundamentals of electric circuits', © The McGraw-Hill Companies, 4th ed, TK454.A452, 2009

Chapman. Stephen J. 'Electric machinery fundamentals' © The McGraw-Hill Companies, 4th ed, ISBN 0--07- 246523, 2005.

7. ILOs Mapping with Level of Competencies

ILOs	Level of Competences					
	A1	A2	A5	A8	B1	C1
a. Knowledge and understanding						
a1	x				X	X
a2	x				X	X
a3	x		x		X	X
a4			x		x	x
b. Intellectual skills						
b1	x	X			X	X
b2	x	x	x		X	X
b3					X	
b4	x	x		x	X	X
c. Professional and practice skills						
c1	x	x		x	X	X
c2				X	X	X
d. General and transferable skills						
d1				X	X	X
d2					x	x

8. Study Plan

Week no	Course Content	Lecture	Tutorial	Laboratory	Total
1	Introduction to Electrical Circuits.	3	2	1	6
2	DC circuits Network theorems	3	2	1	6
3	DC circuits Network theorems	3	2	1	6
4	Sinusoidal alternating current circuits at steady state	3	2	1	6
5	Sinusoidal alternating current circuits at steady state	3	2	1	6
6	Applications of network theorems on alternating current circuits	3	2	1	6
7	Power in AC circuits	3	2	1	6
8	Rotation& Midterm Exam	3	2	---	5
9	Magnetic circuits	3	2	1	6
10	Transformers	3	2	1	6
11	Transformers - Three phase Circuits and systems	3	2	1	6
12	DC Machines	3	2	1	6
13	DC Machines.	3	2	1	6
14	Induction Machines	3	2	1	6
15	Synchronous Machines	3	2	1	6
Total Number of Hours		45	30	15	90

Week	Title of Experiment	Laboratory Hours
1	Introduction to Lab	1
2	DC Circuits: Ohm's law, Kirchhoff's voltage and current laws	1
3	Thevenin's theorem	1
4	Analysis of AC Circuits	1
5	Determination of Equivalent Circuit Parameters of a Single-Phase Transformer	1
6	DC machine.	1

9. Course Content / ILO Matrix

wk.	Course Content	a1	a2	a3	b1	b2	b3	b4	c1	c2	d1	d2
1	Introduction to Electrical Circuits.	X			X			X	X	X	X	X
2	DC circuits Network theorems		X			X		X			X	X
3	DC circuits Network theorems		X					X			X	X
4	Sinusoidal alternating current circuits at steady state		X			X		X			X	X
5	Sinusoidal alternating current circuits at steady state		X			X		X			X	X
6	Applications of network theorems on alternating current circuits		X			X		X			X	X
7	Power in AC circuits		X		X	X					X	X
8	Rotation& Midterm Exam		X					X			X	X
9	Magnetic circuits				X		X	X			X	X
10	Transformers		X		X		X	X			X	X
11	Transformers - Three phase Circuits and systems		X		X		X	X			X	X
12	DC Machines				X		X	X	X	X	X	X
13	DC Machines-				X		X	X	X	X	X	X
14	Induction Machines				X		X	X			X	X
15	Synchronous Machines				X		X	X			X	X

10. Assessment Methods / ILO Matrix

Assessment	a1	a2	a3	b1	b2	b3	b4	c1	c2	d1	d2
Assignments	x	x	x	x	x	x	x			x	x
Quizzes		x	x	x	x	x	x	x	X		
Practical and Oral Exam				x		x	x				
Mid-Term	x			x	x						
Final Exam		x	x	x	x	x	x	x	x		

11. Learning Method / ILO Matrix

Learning Method	a1	a2	a3	b1	b2	b3	b4	c1	c2	d1	d2
Interactive Lecture	x	x	x	x	x	x	x			x	x
Tutorial	x	x	x	x	x	x	x			x	x
Case studies					x	x	x				
Self-Learning	x	x	x								
Practical							x	x	x		

Course Specification

1. Basic Information

ECE215	Introduction to Electronics	**2 CH**
Prerequisites	Electricity and Magnetism	

Number of weekly Contact Hours		
Lecture	Tutorial	Laboratory
2 H	1 H	1 H

Required SWL	100 H	Equivalent ECTS	4

Course Content

According to Bylaw 2018:

Diode and Zener models, diode applications: clamping, voltage doubler, clipping, rectification. Opamp model, opamp applications: Inverting, non-inverting, buffer, summing, filters, Schmitt trigger, oscillators. Analog and Digital signals. A/D and D/A converters.

Used in Program / Level	
Program Name or requirement	Study Level
Mechanical Engineering Requirement	2
Manufacturing Engineering Program	2
Mechatronics Engineering and Automation Program	1

Assessment Criteria				
	Student Activities	Mid-Term Exam	Practical Exam	Final Exam
	20 %	**20 %**	**0 %**	**60 %**
	Exam Duration [Hours]	1 H		2 H

Equivalent to other course in another university	
University	NA
Course code and title	NA

2. Course Aims

The aim of this course is to provide students with:

Introductory knowledge in electronics. The ability to analyze and design basic electronic circuits. deep knowledge for electric circuits theories.

3. Program Competencies Served by Course.

- A: Faculty Requirements
  - **A2:** Develop and conduct appropriate experimentation and/or simulation, analyse and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.
  - **A6:** Plan, supervise and monitor implementation of engineering projects.
- B: Mechanical Engineering Requirements
  - **B.2.1:** Model, design and analyze physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, heat transfer, fluid mechanics, solid mechanics, material processing, material properties, measurement, instrumentation, control theory and systems, mechanical design and analysis, dynamics and vibration.
- C: Program Competences
  - **C3.** Identify and classify the performance of mechatronic systems and components through the use of analytical methods and Modelling techniques

4. Learning Outcomes (LOs)

a.	Knowledge and understanding
a1	Explain basic behavior of electronic components.
a2	Describe electronic circuits and their applications.
b.	Intellectual skills
b1	Develop analytical models for electronic circuits
b2	Analyze electronic circuits problems and search for optimized solutions
b3	Analyze electronic circuits for engineering systems applications
c.	Professional and practice skills
c1	Implement electronic circuits
c2	Test an implemented circuit
c3	Write a technical report containing the design principles and the practical observations
d.	General and transferable skills
d1	Practice team working
d2	Develop ideas and share with others

Level of Competencies

Cognitive Domain	
1	Explain different types of electronic components and circuits.

2	Apply different methods to model and analyze different types of electronic components and circuits.
Psychomotor Domain	
3	Implement the circuit diagram required for the lab and the project.
Affective Domain	
4	Work effectively in teams to implement experimental setups.

5. LOs Mapping with Level of Competencies

LOs	Competences			
	A2	**A6**	**B.2.1**	**C3**
Cognitive Domain				
1			●	●
2			●	●
Psychomotor Domaine				
3	●	●	●	
Affective Domaine				
4	●	●		

6. Assessment and Feedback Strategy

- Quizzes (10%)
- Lab activities and reports (10%)
- Midterm exam (20%)
- Final exam (60%)

7. Teaching and Learning Methods

- Lectures (100% online using MS Teams)
- Tutorials (100% online using MS Teams)
- Practical (75% on campus and 25% online using MS Teams)
- Self-learning

8. List of References

- A. Sedra & K. Smith "Microelectronic Circuits", Oxford University Press, 8th ed. 2019.

9. Study Plan

Week	Course Content	Lecture Hours	Tutorial Hours
1	Introduction to electronics	**2**	**1**
2	Diode operation and models	**2**	**1**
3	Diode applications (1)	**2**	**1**
4	Diode applications (2)	**2**	**1**
5	Transistor operation and models	**2**	**1**
6	Transistor applications (1)	**2**	**1**
7	Transistor applications (2)	**2**	**1**
8	Op-amp operation and models	**2**	**1**
9	Op-amp applications	**2**	**1**
10	Filters	**2**	**1**
11	Oscillators	**2**	**1**
12	Multivibrators	**2**	**1**
13	Analog and digital signals	**2**	**1**
14	D/A converters	**2**	**1**
15	A/D converters	**2**	**1**
Total Number of Hours		**30**	**15**

Week	Title of Experiment	Laboratory Hours
1	Electronic measurement instruments	**1**
2		**1**
3		**1**
4	Diode applications	**1**
5		**1**
6		**1**
7	Transistor applications	**1**
8		**1**
9		**1**
10	Op-amp applications	**1**
11		**1**
12		**1**
13	Introduction to A/D and D/A interfaces	**1**
14		**1**
15		**1**
Total Number of Hours		**15**

10. Course Content / LO Matrix

Wk	Course Content	1	2	3	4
1	Introduction to electronics	√	√		
2	Diode operation and models	√	√		
3	Diode applications (1)	√	√	√	√
4	Diode applications (2)	√	√	√	√
5	Transistor operation and models	√	√		
6	Transistor applications (1)	√	√	√	√
7	Transistor applications (2)	√	√	√	√
8	Op-amp operation and models	√	√		
9	Op-amp applications	√	√	√	√
10	Filters	√	√	√	√
11	Oscillators	√	√	√	
12	Multivibrators	√	√	√	
13	Analog and digital signals	√	√		
14	A/D converters	√	√	√	√
15	D/A converters	√	√	√	√

11. Assessment Methods / LO Matrix

Assessment	1	2	3	4
Quizzes	√	√		
Lab activities and reports			√	√
Mid-Term	√	√		
Final Exam	√	√		

12. Learning Method / LO Matrix

Learning Method	1	2	3	4
Lecture	√	√		
Tutorial	√	√		
Practical			√	√
Self-learning	√	√	√	√

Course Specification

1. Basic Information

MDP331	Maintenance Planning and Scheduling			2 CH
Prerequisites				
Number of weekly Contact Hours				
Lecture		Tutorial		Laboratory
2		1		0
Required SWL	100		Equivalent ECTS	4
Course Content				
Introduction and concepts in maintenance management, Maintenance organization, Types of maintenances: preventive, predictive, programmed, emergency, repair, etc. Maintenance planning and scheduling, spare parts management and control. Total Productive Maintenance (TPM), maintenance information system, maintenance cost, maintenance safety. Different approaches to evaluate Overall Equipment Effectiveness (OEE) and understanding Six Major Equipment Losses.				
Used in Program / Level				
Program Name or requirement			Study Level	
Mechanical Engineering Requirement Elective			3	
Manufacturing Engineering Program			3	
Assessment Criteria				
Student Activities	Mid-Term Exam	Practical Exam	Final Exam	
35%	25%	0%	40%	

2. Course Aims

By the end of the course the students will be able to:

- Understand the basic concepts of maintenance management.
- Master dome of the techniques of maintenance planning and scheduling.
- Identify the concepts of TPM.
- Calculate the maintenance cost
- Determine the OEE of various equipment and production facilities.

3. Learning Outcomes (LOs)

Cognitive domain	
1	Identify maintenance management and TPM Concepts.
2	Differentiate between various maintenance techniques.

3	Calculate the OEE.
Psychomotor Domain	
4	Explain different aspects of maintenance management.
	N/A
Affective Domain	
5	Acknowledge Maintenance Safety procedures

4. Assessment and Feedback Strategy

- Assignments (formative)
- Group project
- In class discussion and student knowledge evaluation
- Written examinations (Midterm and final exam)
- Quizzes were replaced by in class discussions, progress marks, and reading assignment and reporting

5. Teaching and Learning Methods

- Online Lectures
- Online and on-campus Tutorials
- On class exams
- Self-reading and reporting
- Small group project

6. List of References

- Richard (Doc) palmer. “Maintenance Planning and Scheduling Handbook”, 4th Edition, 2019, by the McGraw-Hill Companies. ISBN-13: 978-1260135282

7. LOs Mapping with Level of Competencies

LOs	Level of Competences					
	A3	Bm4				
Cognitive domain						
1	●	●				
2	●	●				
3		●				
Psychomotor Domain						
4	●	●				
Affective Domain						
5		●				

A3. Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.

B4m. Adopt suitable national and international standards and codes to: design, build, operate, inspect and maintain mechanical equipment and systems.

8. Study Plan

No	Course Content	Lecture (hrs)	Tutorial (hrs)
1	Basic Concepts of maintenance management	**2**	**0**
2	Organizing maintenance operations	**2**	**2**
3	Maintenance planning and scheduling	**6**	**3**
4	Spare parts and assemblies' management and planning	**4**	**2**
5	Maintenance operation engineering and industrial safety in maintenance operations	**3**	**1**
6	Total Productive Maintenance (TPM)	**3**	**1**
7	Equipment effectiveness	**2**	**1**
8	High manufacturing efficiencies and safe work environment	**3**	**2**
9	Different approaches to Equipment Effectiveness (OEE)	**3**	**2**
10	Understanding Six Major Equipment Losses.	**2**	**1**
Total Number of Hours		**30**	**15**

9. Course Content / ILO Matrix

Course Content	1	2	3	4	5
Basic Concepts of maintenance management	X	X		X	
Organizing maintenance operations				X	
Maintenance planning and scheduling		X		X	
Spare parts and assemblies' management and planning		X		X	X
Maintenance operation engineering and industrial safety in maintenance operations		X		X	X
Total Productive Maintenance (TPM)	X			X	
Equipment effectiveness	X		X		
High manufacturing efficiencies and safe work environment			X		X
Different approaches to Equipment Effectiveness (OEE)			X		
Understanding Six Major Equipment Losses.				X	

10. Assessment Methods / LO Matrix

Assessment	1	2	3	4	5
Assignments and report	x		x	x	x
Mid Term	x	x			
Quizzes		x			x
Final Exam		x	x	x	x

11. Learning Method / LO Matrix

Learning Method	1	2	3	4	5
Online Lectures	x	x	x	x	x
Online Tutorial Sessions		x	x	x	x
Self-reading		x			

Course Specification

1. Basic Information

<table>
<tr><td colspan="2">MDP 312</td><td colspan="6">Mechanical System Design</td><td colspan="2">3 CH</td></tr>
<tr><td colspan="2">Prerequisites</td><td colspan="8">Machine Elements Design, Hydraulics and Pneumatics</td></tr>
<tr><td colspan="10">Number of weekly Contact Hours</td></tr>
<tr><td colspan="3">Lecture</td><td colspan="4">Tutorial</td><td colspan="3">Laboratory</td></tr>
<tr><td colspan="3">2</td><td colspan="4">2</td><td colspan="3">2</td></tr>
<tr><td colspan="2">Required SWL</td><td colspan="3">125</td><td colspan="2">Equivalent ECTS</td><td colspan="3">5</td></tr>
<tr><td colspan="10">Course Content</td></tr>
<tr><td colspan="10">Project work (mainly an industrial problem with focus on detail design in a system context). Innovation, creativity and patent. Information sources and research, benchmarking. The product development process, project planning. Requirement specification, QFD. Concept development, functions-means tree, concept selection. Detail design, considering environmental effects, material selection, ergonomics. Solid mechanics for modelling and dimensioning (both using FEM and analytical). Manufacturing documents (detail drawings including manufacturing tolerances). Assembling, testing, evaluation and redesign. Presentation and communication, both orally and in different form of written documentation.</td></tr>
<tr><td colspan="10">Used in Program / Level</td></tr>
<tr><td colspan="7">Program Name or requirement</td><td colspan="3">Study Level</td></tr>
<tr><td colspan="7">Design and Production Engineering Program.</td><td colspan="3">3</td></tr>
<tr><td colspan="10">Assessment Criteria</td></tr>
<tr><td colspan="3">Student Activities</td><td colspan="2">Mid-Term Exam</td><td colspan="3">Practical Exam</td><td colspan="2">Final Exam</td></tr>
<tr><td colspan="3">35%</td><td colspan="2">25%</td><td colspan="3">0%</td><td colspan="2">40%</td></tr>
<tr><td colspan="3">Exam Duration [Hours]</td><td colspan="2">1</td><td colspan="3"></td><td colspan="2">2</td></tr>
<tr><td colspan="10">Equivalent to other course in another university</td></tr>
<tr><td colspan="3">University</td><td colspan="7">Faculty requirement</td></tr>
<tr><td colspan="3">Course code and title</td><td colspan="7"></td></tr>
</table>

2. Course Aims

The aim of this course is to provide students with background necessary to:

- Realize the relation between design and product development.
- Understand the difference between mechanical design and system design.
- Use solid mechanics for modelling and dimensioning.
- Present manufacturing documents with details and tolerances.

.

3. Program Competencies Served by Course.

A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.

A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.

A3. Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.

B2m. Carry out designs of mechanical systems and machine elements using appropriate materials both traditional means and computer-aided tools and software contemporary to the mechanical engineering field.

C5a. Demonstrate additional abilities to model, analyze, and design mechanical components and systems using the most up-to-date tools of integrated systems.

4. Learning Outcomes - LOs

Cognitive Domain	
1	Design and develop mechanical systems using appropriate tools and software.
2	Apply the basics of stress analysis in mechanical design.
Psychomotor Domain	
3	Implement a design project on an industrial scale.
Affective Domain	
4	Demonstrate manufacturing documents with detailed drawings.

5. Course LOs Mapping with Level of Competencies

ILOs	Level of Competences				
	A1	A2	A3	B2m	C5a
Cognitive Domain					
1	✓		✓	✓	✓
2	✓		✓	✓	✓
Psychomotor Domain					
3		✓		✓	✓
Affective Domain					
4				✓	✓

6. Assessment and Feedback Strategy

- Assignments 10%
- Lab reports 10%
- Quizzes 15%
- Midterm 25%
- Final 40%

7. Teaching and Learning Methods

- Online interactive Lectures
- Online interactive tutorials
- Face to face tutorials
- Project based learning

8. List of References

- Peter R.N. Childs, Mechanical Design Engineering Handbook, First published 2014 Copyright _ 2014 Elsevier Ltd. All rights reserved. ISBN: 978-0-08-097759-1, 2014, https://doi.org/10.1016/C2011-0-04529-5 (listed in EKB).
- Materials and Design, The art and design of material selection in product design, Mike Ashby and Kara Johnson, Butterworth-Heinemann, Elsevier Science, 2002.
- Engineering Design, A Systematic Approach, Third Edition, Springer, G. Pahl and W. Beitz, 2007.

9. Study Plan

No.	Course Content	Lecture Hours	Tutorial Hours	Lab Hours
1	Introduction, Innovation and creativity.	2	1	
2	Critical thinking, Presentation skills and Problem Solving.	2	1	1
3	Benchmarking, Information sources and research.	2	2	3
4	Design Methodologies and Product development.	4	4	3
5	Quality Function Deployment.	2	2	2
6	Design for X, DFMA, DFA, ….	3	4	4
7	Concept development, functions-means tree.	2	2	2
8	Detail design, environmental effects, material selection, ergonomics.	3	4	3
9	Solid mechanics for modelling and dimensioning.	3	3	4
10	Manufacturing documents, detail drawings and manufacturing tolerances.	3	3	4
11	Reverse Engineering, assembling, testing, evaluation, and redesign.	4	4	4
Total Number of Hours		**30**	**30**	**30**

No	Title of Experiment	Laboratory Hours
1	Demonstrate how to find, evaluate and use information identifying customer needs.	2
2	Collect competitive benchmarking information and set target values for a product. Research and develop issues in design looking for patents and inventions.	4
3	Create appropriate machine design models that represent real structures and components.	4
4	Generate concepts, develop concept classification trees and concept combination tables, screen and score concepts, develop technical product models and develop cost models.	4

5	Gain experience using suitable software to create models of simple structures and machine components. Solve these models to determine deflections and stresses and understand how to interpret the results for engineering application.	4
6	Apply machine design analysis concepts to a real-world problem and document the analysis through well designed drawings as well as a technical report.	6
7	Design a product with consideration of manufacturability and assembly and estimate manufacturing costs.	6
Total Number of Hours		**30**

10. Course Content / LOs Matrix

No	Course Content	1	2	3	4
1	Introduction, Innovation and creativity.	✓		✓	✓
2	Critical thinking, Presentation skills and Problem Solving.	✓		✓	
3	Benchmarking, Information sources and research.	✓			✓
4	Design Methodologies and Product development.	✓	✓		✓
5	Quality Function Deployment.	✓		✓	✓
6	Design for X, DFMA, DFA, ….	✓	✓		✓
7	Concept development, functions-means tree.	✓	✓	✓	✓
8	Detail design, environmental effects, material selection, ergonomics.	✓	✓		✓
9	Solid mechanics for modelling and dimensioning.	✓	✓		✓
10	Manufacturing documents, detail drawings and manufacturing tolerances.	✓	✓	✓	✓
11	Reverse Engineering, assembling, testing, evaluation, and redesign.	✓	✓	✓	✓

11. Assessment and Feedback Strategies / LOs Matrix

Assessment	1	2	3	4
Assignments	✓	✓		✓
Lab reports	✓		✓	
Quizzes	✓	✓		✓
Mid-Term Exam	✓	✓	✓	✓
Final Exam	✓	✓	✓	✓

12. Teaching & Learning Methods / LOs Matrix

Learning Method	1	2	3	4
Lectures	✓	✓	✓	✓
Tutorials	✓	✓		✓
Labs	✓		✓	

Course Specification

1. Basic Information

MDP381	Theory of metal Forming	3 CH
Prerequisites	Manufacturing technology (1)	

Number of weekly Contact Hours		
Lecture	Tutorial	Laboratory
2	2	1

Required SWL	125	Equivalent ECTS	5

Course Content
Engineering and true stress and strain, Stress strain curves and models of mechanical behaviour, Strain rate and its effect on stress strain curve, Deformation and recrystallization, Cold and hot working, Strain hardening, Plastic deformation of metals, Yield criteria, Forging and dimensional changes, Calculation of load during drawing and upsetting, Factors affecting forging load, Rolling and neutral point, Calculation of load rolling mill power, Factors affecting rolling load, Extrusion and metal flow, Extrusion pressure diagram, Calculation of extrusion pressure and parameters affecting extrusion, Wire drawing and wire drawing die, Calculation of wire drawing load, Optimum wire drawing die angle and parameters affecting wire drawing. Tube drawing and dimensional changes in diameter and wall thickness, Calculation of drawing thin walled tubes, Plug tube drawing and mandrel tube drawing. Deep drawing and dimensional changes in flange and wall thickness, Calculation of deep drawing load, parameters affecting deep drawing.

Used in Program / Level	
Program Name or requirement	Study Level
Design and Production Engineering Program	3

Assessment Criteria			
Student Activities	Mid-Term Exam	Practical Exam	Final Exam
35%	25%	0%	40%
Exam Duration [Hours]	1		3

Equivalent to other course in another university	
University	N/A
Course code and title	N/A

2. Course Aims

By the end of the course the students will be able to:

- Demonstrate knowledge and understanding of theoretical analysis of metal forming.
- Represent the theoretical analysis of metal forming processes.
- Recognize different types of theoretical analysis of metal forming processes.
- Formulate load and power problems and identify data required to solve them.
- Solve load and power problems using both approximate and numerical techniques.

- Assess the theoretical analysis of metal forming processes.
- Perform some mechanical measurements

3. Program Competencies Served by Course.

A: Faculty Requirements

A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.

A2. Develop and conduct appropriate experimentation and/or simulation, analyse and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.

C: Program Competences

C1. Implement basic theories to production processes including new technologies in manufacturing to select proper processes and process parameters for specific products.
C3. Implement basics of industrial engineering to analyse, plan and design production systems.

4. Learning Outcomes - LOs

Cognitive Domain	
1	Identify data and structure of theoretical analysis of metal forming processes.
2	Analyze load and power data and parameters affecting metal forming processes.
Psychomotor Domain	
3	Perform theoretical models and analysis of metal forming processes
Affective Domain	
4	Propose alternative solutions to different metal forming processes

5. Course LOs Mapping with Level of Competencies

ILOs	Level of Competences			
	A1	A2	C1	C3
Cognitive Domain				
1	✓		✓	✓
2	✓		✓	✓
Psychomotor Domain				
3		✓	✓	✓
Affective Domain				
4				

6. Assessment and Feedback Strategy

- Assignments 10%
- Lab reports 10%
- Quizzes 15%
- Midterm 25%
- Final 40%

7. Teaching and Learning Methods

- Interactive Lectures
- Face to face tutorials/Lab.

8. List of References

a. Essential books (text books)

1-Chaaban M.A., "An Introduction to Metal Forming", Central Agency for University, 1976
2- Bertram, Elasticity and Plasticity of Large Deformations, Fourth Edition, Springer, 2021.

b. Recommended books

1.D. Banabic, H.-J. Bunge, K. Pohlandt, A.E. Tekkaya, "Formability of Metallic Materials ", Springer-Verlag Berlin Heidelberg New York in 2000
2. Johnson, W., and Mellor, P.B., "Plasticity for Mechanical Engineers". Van Nostrand, 1962.
3. Ford H, and Alexander, I.M., "Advanced Mechanics of Materials", Longman Green, London, 1963.
4. Rowe, G.W., "An Introduction to the Principles of Metalworking". Edward Arnold, London, 1965.

9. Study Plan

No	Course Content	Lecture (hours)	Tutorial (hours)	Lab (hours)
1	Introduction, Mechanical and Metallurgical fundamentals	6	4	2
2	Tensor and yield criteria	4	2	--
3	Springback and classification of metal forming processes	2	---	3
4	Forging analysis (Cogging and upsetting)	4	6	6
5	Rolling analysis	3	4	2
6	Extrusion analysis	3	4	2
7	Wire drawing analysis	4	4	--
8	Tube drawing analysis	3	4	--
9	Deep drawing analysis	1	2	---
Total Number of Hours		30	30	15

No.	Title of Experiment	Laboratory Hours
1	Introduction, Mechanical and Metallurgical fundamentals	2
2	Springback and classification of metal forming processes	3
3	Forging analysis (Cogging and upsetting)	6
4	Rolling analysis	2

5	Extrusion analysis	2
Total Number of Hours		15

10. Course Content / LOs Matrix

No	Course Content	1	2	3	4
1	Introduction, Mechanical and Metallurgical fundamentals	✓		✓	✓
2	Tensor and yield criteria	✓		✓	
3	Springback and classification of metal forming processes	✓	✓	✓	✓
4	Forging analysis (Cogging and upsetting)	✓	✓	✓	✓
5	Rolling analysis	✓	✓	✓	✓
6	Extrusion analysis	✓	✓	✓	✓
7	Wire drawing analysis	✓	✓	✓	✓
8	Tube drawing analysis	✓	✓	✓	✓
9	Deep drawing analysis	✓	✓	✓	✓

11. Assessment and Feedback Strategies / LOs Matrix

Assessment	1	2	3	4
Assignments	✓	✓		✓
Lab reports	✓	✓		
Quizzes	✓	✓		✓
Mid-Term Exam	✓	✓	✓	✓
Final Exam	✓	✓	✓	✓

12. Teaching & Learning Methods / LOs Matrix

Learning Method	1	2	3	4
Lectures	✓	✓	✓	✓
Tutorials	✓	✓		✓
Labs	✓	✓		

Course Specification

1. Basic Information

MDP 382	**Theory of Metal Cutting**		**3 CH**
Prerequisites	**MDP 181 Manufacturing Technology (1)**		
Number of weekly Contact Hours			
Lecture	Tutorial	Laboratory	
2	2	1	
Required SWL	125	Equivalent ECTS	5
Course Content			
Basic concepts and definitions, Tool geometry (definitions, reference planes, geometry of single point tools, twist drills and milling cutters), Tool materials (types and applications), Chip formation (types of chips, built up edge BUE, chip compression ratio, determination of shear angle and shear strain), Mechanics of metal cutting (merchant's analysis, factors affecting cutting forces), Measurement of the cutting forces, Empirical cutting force relationships in conventional cutting (turning, drilling and milling), Heat in metal cutting (heat generation and dissipation, cutting temperature, measurement, distribution, relationships of cutting temperature), Tool failure (types and causes), Tool wear and its measurement, Tool life, Taylor's relationship, Factors affecting tool life, Chatter in machining (causes, measurements, limiting width of cut, factors, affecting the limiting width of cut), Cutting fluids (functions, requirements, types and applications), Surface roughness (sources, parameters, factors affecting surface roughness, theoretical relationship), Machining economy (machining cost equation, optimum tool life, optimum machining variables), Machinability (definitions, criteria and indices).			
Used in Program / Level			
Program Name or requirement	Study Level		
Design and Production Engineering Program.	3		
Manufacturing Engineering Program	3		
Assessment Criteria			
Student Activities	Mid-Term Exam	Practical Exam	Final Exam
35%	**25%**	**0%**	**40%**
Exam Duration [Hours]	**3**		
Equivalent to other course in another university			
University	N/A		
Course code and title	N/A		

2. Course Aims

By the end of the course the students will be able to:

- Understand metal cutting phenomena.
- Control metal cutting phenomena.
- Select the most proper tool material & tool geometry and suitable machine tools
- Estimate cutting forces & motor power for different m/cg processes.
- Determine the optimum values of m/cg variables for max. Productivity & min. cost.

3. Program Competencies Served by Course

A: Faculty Requirements
A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.
A5. Practice research techniques and methods of investigation as an inherent part of learning;
D: Inter-Disciplinary
D2. Model, **Analyze** and design physical systems applicable to the specific discipline by applying the concepts of: Material Properties ~~Measurements, Instrumentation, , Dynamics and Vibrations.~~
D8. Adopt suitable national and international standards and codes to: design, , operate, inspect and maintain industrial equipment and systems.

4. Learning Outcomes (LOs)

Cognitive Domain	
1	Recognizes terminologies and definitions related to metal cutting and tool materials properties and machine tool specifications and the proper selection of machining variables under different cutting conditions [Remembering]
2	Solves the machining problems under different conditions. [Applying]
3	Relates the machining variables, machining quantities workpiece requirements machining economy to evaluate the optimum cutting conditions. [Analyzing]
Psychomotor Domain	
4	Proceeds different machining tests on different tool and workpiece materials combinations on different machine tools according to appropriate testing procedure and standards. [Set]
Affective Domain	
5	Discusses recommended presentation/readings request/in class discussion. [Responds to Phenomena]

5. Course LOs Mapping with Level of Competencies

LOs	**Level of Competences**			
	A2	**A5**	**D2**	**D8**
Cognitive Domain				
1	●			
2	●	●	●	
3			●	
Psychomotor Domain				
4	●			●
Affective Domain				
5		●		●

6. Assessment and Feedback Strategy

Summative Assessment Methods	Formative Assessment Methods
• Assignments (Solving problems/Presentation/In class discussion/ Related-To- Self Reading) - Online + Written • Lab Activities • Quizzes - Online + Written • Written exams (midterm & final term)	• Pop quizzes • In class discussion • Reports

7. Teaching and Learning Methods

- Interactive Lectures; [Microsoft Teams platform] and sometimes face to face on campus
- Tutorials; [Mix of Microsoft Teams platform & on campus]
- Practical lab activities; [on campus]
- Presentation & In class discussion [on campus]
- Lectures notes were published to students via LMS and recorded via Microsoft Teams platform

8. List of References

a. **Course notes**
   -Developed by course instructors uploaded to LMS

b. **Essential books (textbooks)**

- David A. Stephenson & John S.Agapiou " Metal Cutting Theory and Practice", CRC Press (2016)
- Shaw, M. C. " Metal Cutting Principles " Oxford Press 1997

c. **Web sites and c. Periodicals, … etc**

9. Study Plan

No	Course Content	Lecture (hours)	Tutorial (hours)	Lab
1	Basic concepts and definitions	2	3	-
2	Cutting tool materials	3	2	2
3	Tool geometry	2	2	2
4	Effective tool geometry	1	1	-
5	Chip formation	3	1	2
6	Mechanics of metal cutting	3	3	2
7	Cutting forces, torque and power	3	3	2
8	Mid Term			
9	Cutting temperature & Cutting fluids	3	2	2
10	Tool failure	2	2	1
11	Tool life	1	1	-
12	M/cg economy & product	2	3	-
13	Optimum M/cg variables	1	3	-
14	Machine tool chatter	2	-	1
15	Surface roughness & machinability	2	2	1
	Total	**30**	**30**	**15**

Week	Title of Experiment	Lab Hours
2	M/cg Variables & Machining time	**2**
3	Selection of Tool materials and Tool Geometry	3
5	Chip Formation And Chip compression Ratio (λc)	**2**
6	Orthogonal Cutting Forces	1
7	Conventional Cutting Forces	2
8	Mid Term	
9	Cutting temperature	2
11	Tool Wear and Tool Life	**1**
13	Machine tool chatter	**1**
14	Surface Roughness	1
	Total Hours	**15**

10. Course Content / LOs Matrix

Topic	Course Content	1	2	3	4	5
1	Basic concepts and definitions	●				
2	Cutting tool materials	●	●	●		●
3	Tool geometry	●	●		●	
4	Effective tool geometry	●	●		●	
5	Chip formation	●	●		●	
6	Mechanics of metal cutting	●	●		●	
7	Cutting forces, torque and power	●	●		●	
8	Cutting temperature & Cutting fluids	●	●		●	
9	Tool failure	●	●	●	●	●
10	Tool life	●	●		●	
11	M/cg economy & product	●	●		●	
12	Optimum M/cg variables	●	●		●	
13	Machine tool chatter	●			●	
14	Surface roughness & machinability	●	●		●	

11. Assessment & Feedback Strategies / LOs Matrix

Assessment Methods	1	2	3	4	5
Assignments (Solving problems/Presentation/In class …...	●	●			●
Lab Activities	●			●	
Quizzes (2-4)		●			
Written exams (Mid-Term & Final)	●	●	●		

12. Teaching & Learning Methods / LOs Matrix

Learning Methods	1	2	3	4	5
Lectures	●		●		
Tutorial	●	●	●		●
Practical Experiments	●			●	
Presentation & In class discussion					●

Instructors: Prof. Dr. Mohamed Abdel Salam Ali (+201001907308)
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Version: 180130

Course Specification

1. Basic Information

MDP 383	**Metal Forming Technology, Machines and Dies**		**3 CH**
Prerequisites	**MDP 181 Manufacturing Technology (1)**		
Number of weekly Contact Hours			
Lecture	Tutorial	Laboratory	
2	2	1	
Required SWL	125	Equivalent ECTS	5
Course Content			
Metal forming technology: process, product design of forgings, rolling sections, extrusion, wire, tube and deep drawing. Powder metallurgy (powder production, compaction, sintering and sizing). Metal forming machines: types, details, parts and operation including forging hammers, presses, horizontal forging machines, rolling mills, extrusion presses, wire and tube drawing and deep drawing. Metal forming Dies design: forging, roll pass, extrusion, wire, tube and deep drawing of cylindrical cup with and without flanges. Quadratic and rectangular shapes, ironing.			
Used in Program / Level			
Program Name or requirement		Study Level	
Design and Production Engineering Program.		3	
Assessment Criteria			
Student Activities	Mid-Term Exam	Practical Exam	Final Exam
35%	**25%**	**0%**	**40%**
Exam Duration [Hours]	**3**		
Equivalent to other course in another university			
University	N/A		
Course code and title	N/A		

2. Course Aims

By the end of the course the students will be able to:

- Identify the fundamental concept of different method of metal forming
- Understand advantages and limits for each method of forming processes
- Understand the theoretical and practical foundations of the different forming processes
- Choose the suitable forming process for specific application.
- Recognize the concept of metal forming machines and dies.
- Understand the sheet metal dies

3. Program Competencies Served by Course

A: Faculty Requirements:
A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.
C: Program Requirements:
C1. Implement basic theories to production processes including new technologies in manufacturing to select proper processes and process parameters for specific products
C2. Design systems, machines, tools, and products implementing proper standards and developing the necessary calculations, construction and working drawings

4. Learning Outcomes (LOs)

Cognitive Domain	
1	Recognizes terminologies and definitions related to metal forming processes.
2	Show the metal forming machines and dies.
3	Select metal forming process and metal forming machines for given product.
Psychomotor Domain	
4	Design metal forming passes and metal forming dies.
Affective Domain	
5	Beware of the problems resulting from metal forming processes and seek solutions.

5. Course LOs Mapping with Level of Competencies

LOs	Level of Competences		
	A2	C1	C2
Cognitive Domain			
1	●		
2	●	●	●
3			●
Psychomotor Domain			
4	●		
Affective Domain			
5		●	

6. Assessment and Feedback Strategy

Method of assessment	Percentage of total
Written Final Examination	40%
Assignments	10%
Quiz	10%
Written Midterm examinations	25%
Participation /class work	5%
Project	10%
Total	100%

Week	Title of Experiment	Lab Hours
2	Presses and hammers	**2**
4	Forging and upsetting	**2**
6	Rolling	**2**
8	Extrusion	**2**
10	Wire drawing	2
12	Powder metallurgy	2
14	Sheering dies.	**3**
Total Hours		**15**

7. Teaching and Learning Methods

- Interactive Lectures; [Microsoft Teams platform] and sometimes face to face on campus
- Tutorials; [Mix of Microsoft Teams platform & on campus]
- Practical lab activities; [on campus]
- Presentation & In class discussion [on campus]
- Lectures notes were published to students via LMS and recorded via Microsoft Teams platform

8. List of References

a. Course notes

-Developed by course instructors uploaded to LMS

b. Essential books (textbooks)

1- Dorel Banabic, Sheet Metal Forming Processes, Springer 5th edition 2026
DOI 10.1007/978-3-540-88113

2- Vukota Boljanovic, J R Paquin and Robert E Crowley, Die Design Fundamentals, Third Edition 2006.

3- S. Kalpakjiam, "Manufacturing Engineering and Technology", 5th Edition, Pearson Prentice Hall, 2006.

9. Study Plan

No	Course Content	Lecture (hours)	Tutorial (hours)	Lab
1	Fundamentals of metal forming process	**2**	**0**	**-**
2	Hammer and presses.	**2**	**2**	**2**
3	Forging process	**2**	**2**	**2**
4	Rolling process and rolling mills	**4**	**2**	**3**
5	Extrusion process and extrusion machine sand dies	**2**	**2**	**3**
6	Wire drawing process and wire drawing machines	**2**	**2**	**2**
7	Forming limiting diagram	**2**	**2**	**1**
8	Powder metallurgy process and dies	**2**	**2**	**2**
9	Deep drawing process and dies	**2**	**2**	**-**
10	Sheet metal working processes and dies	**2**	**2**	**-**
11	Concepts of shearing and bending dies	**2**	**4**	**-**
12	Shearing dies	**4**	**4**	**-**
13	Bending dies	**2**	**4**	**-**
	Total	**30**	**30**	**15**

10. Course Content / LOs Matrix

Topic	Course Content	1	2	3	4	5
1	Fundamentals of metal forming process	●				●
2	Hammer and presses.		●	●		●
3	Forging process		●		●	
4	Rolling process and rolling mills	●	●	●	●	
5	Extrusion process and extrusion machine sand dies	●	●		●	
6	Wire drawing process and wire drawing machines	●	●		●	●
7	Forming limiting diagram	●	●		●	
8	Powder metallurgy process and dies			●	●	
9	Deep drawing process and dies		●	●	●	●
10	Sheet metal working processes and dies		●		●	
11	Concepts of shearing and bending dies	●	●	●	●	●
12	Shearing dies		●	●	●	●
13	Bending dies		●		●	

11. Assessment & Feedback Strategies / LOs Matrix

Assessment Methods	1	2	3	4	5
Assignments (Solving problems/Presentation/In class …...	●	●			●
Lab Activities	●			●	
Quizzes (2-4)		●			
Project		●		●	
Written exams (Mid-Term & Final)	●	●	●		

12. Teaching & Learning Methods / LOs Matrix

Learning Methods	1	2	3	4	5
Lectures	●		●		
Tutorial	●	●	●		●
Practical Experiments	●			●	
Presentation & In class discussion					●

Course coordinator : Prof. Ahmed Elsabbagh
01005280270

Course Specification

1. Basic Information

MDP 384	Metal Cutting Machines and Technology		**3 CH**
Prerequisites	Manufacturing Technology (1), Machine Elements Design		
Number of weekly Contact Hours			
Lecture	Tutorial	Laboratory	
2	2	2	
Required SWL	150	Equivalent ECTS	6
Course Content			
Rigidity of machine tools and the accuracy of production, Spindles of machine tools, Frame parts of machine tools, Drives of machine tools, Machining tolerance and allowances, Process and operation sheet preparation, Capstan and turret lathes, Hobbing and gear shaping machines, Gear cutting operations, Grinding operations, Super finishing operations.			
Used in Program / Level			
Program Name or requirement	Study Level		
Design and Production Engineering Program requirement	3		
Assessment Criteria			
Student Activities	Mid-Term Exam	Practical Exam	Final Exam
35 %	**25%**	**0%**	**40%**

2. Course Aims

This course aims to:

- Predict the accuracy of products, machined on metal cutting machine tools (MCMT).
- Design elements of MCMT (e.g., drives, spindle units, frame parts).
- Select the appropriate MCMT, as well as the Parameters as the metal cutting to attain a required level of accuracy of product.
- Study the capstan, turret machines and determine the different fields of applications.
- Differentiate between various types of gear cutting operations and machines.
- Select either grinding operations or super finishing operations to be applied to get the required level of accuracy of product.

3. Program Competencies Served by Course.

In addition to the competences for all Engineering Programs (A-Level) and the competencies for the Mechanical Discipline (B-Level), the Design and Production Engineering Program graduate must be able to (C-Level):

C1. Implement basic theories to production processes including new technologies in manufacturing to select proper processes and process parameters for specific products.

C2. Design systems, machines, tools, and products implementing proper standards and developing the necessary calculations, construction and working drawings

4. Learning Outcomes (LOs)

Cognitive Domain	
1	Select the proper kind of manufacturing operation based on the product requirements.
2	Apply the principles and formulas to choose the suitable parameters of MCMT elements to get the required level of accuracy of product.
Psychomotor Domain	
3	Arrange the production line machines to manufacture a product with the required level of accuracy.
4	Build an operation and process sheet for a product.
Affective Domaine	
5	work in ~~Construct and manage a~~ teamwork in a project.
6	follow a project report scientific standards guideline. ~~Present a~~

5. Course LOs Mapping with Level of Competencies

Design & Production Engineering Program

LOs	Competences	
	C1	C2
Cognitive Domain		
1	●	
2		●
3	●	●
4	●	
Affective Domaine		
5	●	●
6	●	●

6. Assessment and Feedback Strategy

- Assignments and lab reports (online & written)
- Quizzes (online & written)
- Written examinations (midterm & final term)

7. Teaching and Learning Methods

- Lectures (on campus & online using Microsoft Teams platform)
- Tutorial (on campus & online using Microsoft Teams platform)
- Lab (on campus & online using Microsoft Teams platform)

8. List of References

a. Essential books (textbooks)

- S. Kalpakjiam, "Manufacturing Engineering and Technology", 5th Edition, Pearson Prentice Hall, 2006.
- Ammar Grous, " Applied Mechanical Design ", 1st Edition, Wiley, 2018. (EKB) https://0810e73i0-1106-y-https-onlinelibrary-wiley-com.mplbci.ekb.eg/doi/book/10.1002/9781119137658

b. Recommended books

- R.K. Jain " Production Technology ", 6th Edition, Khanna Publishers, 2006.
- Richard G. Budynas, J. Keith Nisbett, "Shigley's Mechanical Engineering Design", 19th Edition, Mc Graw Hill, 2011. (EKB).

9. Study Plan

No.	Course Content	Lect.	Tut.	Lab.	Total
1	Performance criteria of machine tool design	2	2	2	6
2	Rigidity of MFTW system and the accuracy of production on machine tools	4	4	4	12
3	Drives of machine tools	6	6	6	18
4	Machine tool spindles and spindle bearings	4	4	4	12
5	Frame Parts of machine tools	2	2	2	6
6	Tolerances and Allowances	2	2	2	6
7	Operation and Process Sheets	2	2	2	6
8	Capstan and Turret Lathes	2	2	2	6
9	Gear Cutting Operations	4	4	4	12
10	Grinding and Superfinishing Operations	2	2	2	6
Total Number of Hours		30	30	30	90

Experiments List

- Capstan and Turret Lathes and Operations.
- Gear Cutting Machines and Operations.
- Grinding and Super Finishing Machines and Operations.
- Project (A product or assembly will be produced using most of machine and operations covered in this course and a project report will be delivered also).

10. Course Content / LOs Matrix

Topic	Course Content	1	2	3	4	5	6
1	Performance criteria of machine tool design		●			●	●
2	Rigidity of MFTW system and the accuracy of production on machine tools		●			●	●
3	Drives of machine tools		●			●	●
4	Machine tool spindles and spindle bearings		●			●	●
5	Frame Parts of machine tools		●			●	●
6	Tolerances and Allowances	●				●	●
7	Operation and Process Sheets	●		●	●	●	●
8	Capstan and Turret Lathes	●		●	●	●	●
9	Gear Cutting Operations	●		●	●	●	●
10	Grinding and Superfinishing Operations	●		●	●	●	●

11. Assessment and Feedback Strategies / LOs Matrix

Assessment Method	1	2	3	4	5	6
Assignments and reports	●	●	●	●	●	●
Quizzes	●	●	●	●		
Mid-Term	●	●	●	●		
Final Exam	●	●	●	●		

12. Teaching & Learning Methods / LOs Matrix

Learning Method	1	2	3	4	5	6
Lecture	●	●	●	●		
Tutorial	●	●	●	●	●	●
Lab	●	●	●	●	●	●
Self-learning	●	●	●	●	●	●

Course Specifications

1. Basic Information

MDP 481	**Design of Cutting Tools and Production Facilities**	**3 CH**
Prerequisites	**MDP 382 Theory of Metal Cutting**	

Number of weekly Contact Hours		
Lecture	Tutorial	Laboratory
2	2	0

Required SWL	100	Equivalent ECTS	4

Course Content

Jigs and Fixture: Advantages of jigs and fixtures, Principles of location, Types of locators, over-determined location, principles of clamping, types of clamping, calculations of clamping forces, Design of drilling jigs, indexing jigs, milling fixtures, indexing table, single and multiple pieces' fixtures, turning fixtures, welding fixture, and assembly fixture, Manufacturing of jigs and fixture, Economy of jigs and fixtures.
Cutting tools: Modern cutting tool materials, Design and manufacturing of turning form tools, form relieved milling cutters, drilling tools and broaching tools.

Used in Program / Level	
Program Name or requirement	Study Level
Design and Production Engineering Program.	4

Assessment Criteria			
Student Activities	Mid-Term Exam	Practical Exam	Final Exam
35%	**25%**	**0%**	**40%**
Exam Duration [Hours]	**3**		

Equivalent to other course in another university	
University	N/A
Course code and title	N/A

2. Course Aims

By the end of the course the students will be able to:

- Understand the functions and the importance of jigs and fixtures and the needs of them in manufacturing processes.
- Recognized the different types of jigs and fixtures.
- Design jigs and fixture for various manufacturing processes.
- Recognized the different types of commercial and general purpose cutting tools.
- Define the specifications of tools for a specific cutting operation.
- Design cutting tools for special cutting operations.

3. Program Competencies Served by Course

A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.
A3. Apply engineering design processes to produce cost-effective solutions that meet specified needs.
B1m. Model, analyze and design physical systems applicable to the specific discipline by applying the concepts of: Mechanical Design and Analysis.
B3m. Select conventional mechanical equipment according to the required performance.
B4m. Adopt suitable national and international standards and codes to: design, build, operate, inspect and maintain mechanical equipment and systems.
C2. Design systems, machines, tools, and products implementing proper standards and developing the necessary calculations, construction and working drawings
C4. Select materials suitable for specific application.

4. Learning Outcomes (LOs)

Cognitive Domain	
1	Identify the economical and technological needs of jigs and fixtures as well as form tools and broaching tools for a specific manufacturing process
2	Design the different types of jigs and fixtures for specific manufacturing processes.
3	Identify the specifications of cutting tools for specific metal cutting processes
4	Design turning form tools, shaping form tool, form relieved milling tools and broaching tools for specific metal cutting processes.
psychomotor Domain	
5	Preparing construction and detail drawings of jigs and fixtures as well as cutting tools
Affective Domain	

5. Course LOs Mapping with Level of Competencies

LOs	**Level of Competences**						
	A1	**A3**	**B1m**	**B3m**	**B4m**	**C2**	**C4**
Cognitive Domain							
1		●		●			●
2	●	●	●		●	●	
3				●			●
4	●	●	●		●	●	
Psychomotor Domain							
5					●		

6. Assessment and Feedback Strategy

Summative Assessment Methods	Formative Assessment Methods
• Assignments (Solving problems) (in class + Online), (Written and oral). • Quizzes • Written exams (midterm & final term)	• In class discussion • Reports

7. Teaching and Learning Methods

- Interactive Lectures; [Microsoft Teams platform]and face to face on campus (blended learning)
- Tutorials; [Online through Microsoft Teams platform &face to face on campus]

8. List of References

a. **Course notes**

-Developed by course instructors uploaded to LMS

b. **Essential books (textbooks)**

1- "An Introduction to Jig and Tool Design", M. H. A. Kempster, ELBS, 1974.

2- "Principles of Jig and Tool Design", M.. H. A. Kempster, The English University Press LTD,1968

3- Fundamentals of tool design", SME, USA, 2010

Design of Jigs, Fixtures and Press Tools, K.Venkataraman, 2nd. Edition, Springer, 2022

a. **Web sites and c. Periodicals, … etc**

9. Study Plan

No	Course Content	Lecture (hours)	Tutorial (hours)
1	Definition of jigs and fixtures and its importance and types	1	1
2	Principal of locations and types of locators	3	2
3	Principal of clamping	3	2
4	Design of Drilling jigs	4	5
5	Design of Milling Fixtures	4	5
6	Turning tools (conventional and form tool)	4	5
7	Milling cutters (conventional and form relieved cutters)	4	2
	Twist drill tools and reamers	1	2
9	Gear cutters	2	2
10	Broaching tools	4	4
	Total	**30**	**30**

10. Course Content / LOs Matrix

Topic	Course Content	1	2	3	4	5
1	Definition of jigs and fixtures and its importance and types	●	●			
2	Principal of locations and types of locators		●			
3	Principal of clamping		●			
4	Design of Drilling jigs		●			●
5	Design of Milling Fixtures		●			●
6	Turning tools (conventional and form tool)	●		●	●	●
7	Milling cutters (conventional and form relieved cutters)	●		●	●	●
8	Twist drill tools and reamers			●	●	
9	Gear cutters			●	●	
10	Broaching tools	●		●	●	●

11. Assessment & Feedback Strategies / LOs Matrix

Assessment Methods	1	2	3	4	5
Assignments (Solving problems and case study/Presentation/In class …...		●		●	●
Reports	●	●	●		
Quizzes		●		●	●
Written exams (Mid-Term & Final)		●		●	●

12. Teaching & Learning Methods / LOs Matrix

Learning Methods	1	2	3	4	5
Lectures	●	●		●	
Tutorial		●	●	●	●

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Version: 180130

Course Specification

1. Basic Information

<table>
<tr><td>MDP482</td><td colspan="4">Metrology and Measuring Instruments</td><td>4 CH</td></tr>
<tr><td>Prerequisites</td><td colspan="5"></td></tr>
<tr><td colspan="6">Number of weekly Contact Hours</td></tr>
<tr><td colspan="2">Lecture</td><td colspan="2">Tutorial</td><td colspan="2">Laboratory</td></tr>
<tr><td colspan="2">3</td><td colspan="2">0</td><td colspan="2">5</td></tr>
<tr><td>Required SWL</td><td>200</td><td colspan="2">Equivalent ECTS</td><td colspan="2">8</td></tr>
<tr><td colspan="6">Course Content</td></tr>
<tr><td colspan="6">Measuring Instruments: International system of units and standards, types of instrument magnification (mechanical, optical, electric, digital and pneumatic), measuring signals; static and dynamic response; design of limit gauges, simple measuring instruments, measuring instruments components; kinematics, comparators, measuring machines, CMM, advanced measuring techniques; computer vision, laser measurement, Nano measurement.

Metrology: Linear measurement, angular measurement, form measurement, screw thread and gear measurement, geometric errors; straightness, flatness, roundness, squareness, alignment, parallelism and surface roughness measurement. Static tests for machine tools. Using CMM and advanced techniques in measurements.</td></tr>
<tr><td colspan="6">Used in Program / Level</td></tr>
<tr><td colspan="4">Program Name or requirement</td><td colspan="2">Study Level</td></tr>
<tr><td colspan="4">Design and Production Engineering Program requirement</td><td colspan="2">4</td></tr>
<tr><td colspan="6">Assessment Criteria</td></tr>
<tr><td>Student Activities</td><td>Mid-Term Exam</td><td colspan="2">Practical Exam</td><td colspan="2">Final Exam</td></tr>
<tr><td>20%</td><td>25%</td><td colspan="2">15%</td><td colspan="2">40%</td></tr>
</table>

2- Course Aims

By the end of the course the students will be able to:

- Recognize the different metrological devices, tools, and equipment
- Use the different techniques used to identify the dimensional and geometrical errors.
- Identify the proper measuring device to perform a specific metrological process
- Define the proper measuring procedure to carry out the required measuring operations.
- Prepare the final reports containing the measuring observations and the final conclusions.
- Design a special limit gauges to check item parameters in mass production.
- Calibrate, handle and store the measuring equipment.

3. Program Competencies Served by Course

A: Faculty Requirements
A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.
A7. Function efficiently as an individual and as a member of multi-disciplinary and multi-cultural teams.
B: Mechanical Requirements
B1m. Model, analyze and design physical systems applicable to the specific discipline by applying the concepts of: Measurements, Instrumentation, **B4m**. Adopt suitable national and international standards and codes to: design, build, operate, inspect and maintain mechanical equipment and systems.
C: Design and Production Program Requirements
C1. Implement basic theories to production processes including new technologies in manufacturing to select proper processes and process parameters for specific products.
C2. Design systems, machines, tools, and products implementing proper standards and developing the necessary calculations, construction and working drawings.

4.Learning Outcomes (LOs)

Cognitive Domain	
1	Identify the proper measuring device and equipment to perform a specific metrological process.
2	Analyze the measuring observation to take decision regarding product acceptance
3	Design gauges to check specified item parameters

Psychomotor Domain	
4	Use carefully and accurately the measuring devices in different metrological operations
Affective Domain	
5	Handle voluntary the measuring equipment accurately and carefully

5. Course LOs Mapping with Level of Competencies

LOs	**Level of Competences**					
	A2	**A7**	**B1m**	**B4m**	**C1**	**C2**
Cognitive Domain						
1					●	
2	●		●		●	
3	●			●		●
Psychomotor Domain						
4	●	●				
Affective Domain						
5				●		

6. Assessment and Feedback Strategy

Summative Assessment Methods	**Formative Assessment Methods**
● Experimental works ● Quizzes ● Written exams (midterm & final term) ● Practical	● Reports

7. Teaching and Learning Methods

- Interactive Lectures; (blended learning); Campus or Online
- Experimental work
- Discussion [Online or In campus]

8. List of References

a. Course notes

-Developed by course instructors uploaded to LMS

b. Essential books (textbooks)

Koura, M., Rizk, M. A. and Awad, M. A., Dimensional Metrology, EL hakeem press, 2010.

Fundamentals of Dimensional Metrology; Connie L. Dotson, 2016

Reference books

Gupta, R. C., Engineering Precision Metrology, Khanna Publishers, 1979
Jain, Engineering Metrology, Khanna Publisher, 1999

ENGINEERING METROLOGY AND MEASUREMENTS, N.V. RAGHAVENDRA and L. RISHNAMURTHY, ISBN-13: 978-0198085492, ISBN-10: 9780198085492, Oxford University Press, 2016

c. Web sites and c. Periodicals, … etc

9. Study Plan

No	Course Content	Lecture (hours)	Lab hours
1	Basic concept and definitions and design recommendations	3	
2	Method of magnification of sensed measured signals	3	5
3	Mechanical metrological tools and equipment.	3	5
4	Optical metrological tools and equipment.	3	5
5	Electrical metrological tools and equipment.	3	
6	Design of limit gauges	3	
7	Calibration of metrological equipment	3	5
8	Linear dimensional measuring techniques	3	10
9	Angular dimensional measuring techniques	3	10
10	Measurements of thread and gears	3	10
11	Form (geometrical) errors measuring techniques	3	5
12	Roughness measurements	3	5
13	Machine acceptance tests	3	5
14	CMM	3	10
15	New trend in measurement techniques	3	
	Total	**45**	**75**

No	Title of Experiments	Lab hours
1	Basic concept and definitions and design recommendations	
2	Method of magnification of sensed measured signals	5
3	Mechanical metrological tools and equipment.	5
4	Optical metrological tools and equipment.	5
5	Calibration of metrological equipment	5
6	Linear dimensional measuring techniques	10
7	Angular dimensional measuring techniques	10
8	Measurements of thread and gears	10
9	Form errors measurements	5
10	Roughness measurements	5
11	Machine acceptance tests	5
12	CMM	10
	Total	**75**

10. Course Content / LOs Matrix

Topic	Course Content	1	2	3	4	5
1	Basic concept and definitions and design recommendations			●		●
2	Method of magnification of sensed measured signals	●		●		
3	Mechanical metrological tools and equipment.	●		●		
4	Optical metrological tools and equipment.	●		●	●	
5	Electrical metrological tools and equipment.	●		●	●	
6	Design of limit gauges	●		●	●	
7	Calibration of metrological equipment			●	●	
8	Linear dimensional measuring techniques			●	●	●
9	Angular dimensional measuring techniques	●		●	●	
10	Measurements of thread and gears		●	●	●	
11	Form (geometrical) errors measuring techniques		●	●	●	
12	Roughness measurements		●		●	
13	Machine acceptance tests		●		●	
14	CMM		●		●	
15	New trend in measurement techniques				●	

11. Assessment & Feedback Strategies / LOs Matrix

Assessment Methods	1	2	3	4	5
Written exams (Mid-Term & Final)	●	●	●		
Lab Activities	●	●	●	●	●
Practical exam	●	●		●	●

12. Teaching & Learning Methods / LOs Matrix

Learning Methods	1	2	3	4	5
Lectures (Online or in campus)	●	●	●		
Laboratory Work	●	●	●	●	●
discussion (online + lab. in campus)	●	●	●	●	●

Course Specification

1. Basic Information

MDP333	**Operations Research**		3 CH
Prerequisites	Mathematics (2), Probability and Statistics		
Number of weekly Contact Hours			
Lecture	Tutorial	Laboratory	
2	2	0	
Required SWL	150	Equivalent ECTS	Required SWL
Course Content			
Linear programming: Formulation, Graphical solution, Simplex method, and Duality and sensitivity analysis, Transportation models: Transportation algorithm, Assignment problem and transshipment problem, Network models: Minimal spanning tree algorithm, Shortest route problem and Maximum flow problem, Branch and bound algorithm.			
Used in Program / Level			
Program Name or requirement	Study Level		
Design and Production Engineering Program	3		
Manufacturing Engineering Program Concentration	4		
Assessment Criteria			
Student Activities	Mid-Term Exam	Practical Exam	Final Exam
35%	25%	0%	40%
Exam Duration [Hours]	1.5 Hrs		3Hrs
Equivalent to other course in another university			
University	N/A		
Course code and title	N/A		

2. Course Aims

Overall aims of course

By the end of the course the students will be able to:

- Identify problems that may be approached using linear programming, transportation, and networking models.
- Determine the data required to model an LP problem.
- Develop a mathematical LP model of the problem.
- Use mathematical tools to analyze the LP model .
- Perform sensitivity analysis on the results of an LP model.

- Apply various transportation and networking algorithms.
- Apply simulation models and make necessary analysis of results
- Use computer software to solve LP, transportation, and networking problems

3. Program Competencies Served by Course.

A: Faculty Requirements

- A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.
- A5. Practice research techniques and methods of investigation as an inherent part of learning.
- A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.

C: Faculty Requirements

- C3. Implement basics of industrial engineering to analyze, plan and design production systems.
- C5b. Demonstrate additional abilities to analyze, design, integrate, operate, evaluate, control, automate, and implement methods and techniques to manage industrial systems.

4. Learning Outcomes (LOs)

a.	Knowledge and understanding
a1	Explain the problem of OR
a2	Describe the nature and determinants of the mathematical modeling
a3	Describe the characteristics of the linear programming problems
a4	Explain the concepts followed in solving LP and transportation problems
a5	Explain the results obtained from the sensitivity investigation of LP problems
a6	Describe the networking problems with different solution approaches
b.	Intellectual skills
b1	Model linear programming problems
b2	Analyze transportation problems
b3	Analyze the results obtained from solving linear programming problems
b4	Design the networking problem
c.	Professional and practice skills
c1	Solve real cases using linear programming techniques
c2	Solve special problems using transportation modeling and solution techniques
c3	Model for solving networking problems
c4	Apply sensitivity analysis techniques
c5	Interpret the results of solving OR problems
d.	General and transferable skills
d1	Acquire entrepreneurial skills.
d2	Manage time, tasks, and resources efficiently.

Cognitive Domain	
1	Identify and explain the essential concepts of approaching decision making real life problems that can be solved applying operations research tools and techniques and the way in which they are developed and mathematically modeled.
2	Apply different operations research heuristics and techniques that are used in solving real life problems.
3	Critically analyze, evaluate, and identify the relevance and significance of different operations research general solution approaches and those uses special heuristic algorithms.
Psychomotor Domain	
4	use computer software for solving operations research problems.
	N/A
	N/A
Affective Domain	
5	Work in groups on course and work tasks to meet the objectives given; choose and use approaches to meet own responsibilities.
6	N/A
	N/A

5. Course LOs Mapping with Level of Competencies

LOs	Competences				
	A1	**A5**	**A10**	**C3**	**C5b**
Cognitive Domain					
1	●	●	●		
2	●	●	●	●	●
3	●	●	●	●	●
Psychomotor Domaine					
4	●		●	●	●
Affective Domaine					
5		●	●	●	●
6			●		●

6. Assessment and Feedback Strategy

- Formative Assessment Methods:
  - In-Class Discussion
- Summative Assessment Methods:
  - Assignments.
  - Quizzes.
  - Written Exams (Midterm and Final Exams).

7. Teaching and Learning Methods

- Interactive Lectures
- Self-Readings
- Problem Solving and real life case studies
- Collaborating learning (Team Project)

8. List of References

- Operations Research, an Introduction, 10th Ed., Hamdy A. Taha, Prentice Hall, ISBN-13: 978-0134444017, ISBN-10: 0134444019
- Introduction to operations research, 10th Edition Authors: Frederick S. Hillier, Gerald J. Lieberman, McGraw-Hill, ISBN-13: 978-1260575873,ISBN-10: 126057587X

9. Study Plan

Week	Course Content	Lecture Hours	Tutorial Hours	Lab Hours
1	Intro to OR and Problem Formulation	3		
2	Problem Formulation and Graphical Solution and Algebraic solution	4	2	
3	Simplex Method for Linear Programming	4	2	4
4	Geometry of Simplex Algorithm	4	2	
5	Duality in Linear Programming	2	2	2
6	Sensitivity Analysis in Linear Programming	3	2	2
7	Assignment and Transportation Models	3	2	4
8	Transshipment Problem.	3	1	3
9	Network Models: Maximal Flow Problem, Shortest Route Problem and Minimal Spanning problems	4	2	
	Total Hours	30	30	15

1. Course Content / LOs Matrix

Topic	Course Content	1	2	3	4	5
1	Intro to OR and Problem Formulation	●	●	●		
2	Problem Formulation and Graphical Solution and Algebraic solution	●	●	●		●
3	Simplex Method for Linear Programming	●	●	●	●	●
4	Geometry of Simplex Algorithm	●	●	●		
5	Duality in Linear Programming	●	●	●	●	
6	Sensitivity Analysis in Linear Programming	●	●	●	●	
7	Assignment and Transportation Models	●	●	●	●	●
8	Transshipment Problem.	●	●	●	●	●
9	Network Models: Maximal Flow Problem, Shortest Route Problem and Minimal Spanning problems	●	●	●		●

2. Assessment and Feedback Strategies / LOs Matrix

Assessment	1	2	3	4	5
Assignments		●	●	●	●
In Class Discussion	●	●	●	●	●
Quizzes		●	●		
Mid-Term Exam	●	●	●		
Final Exam	●	●	●		

3. Written Exams Teaching & Learning Methods / LOs Matrix

Learning Method	1	2	3	4	5
Interactive Lectures	●	●	●		
Self-Readings and case studies	●	●	●		●
Problem Solving (Assignments)		●	●	●	

Course Specification

1. Basic Information

<table>
<tr><td colspan="2">MDP431</td><td colspan="8">Operations Management</td><td colspan="2">3 CH</td></tr>
<tr><td colspan="2">Prerequisites</td><td colspan="10">Engineering Economy</td></tr>
<tr><td colspan="12">Number of weekly Contact Hours</td></tr>
<tr><td colspan="4">Lecture</td><td colspan="4">Tutorial</td><td colspan="4">Laboratory</td></tr>
<tr><td colspan="4">2</td><td colspan="4">2</td><td colspan="4">0</td></tr>
<tr><td colspan="3">Required SWL</td><td colspan="3">150</td><td colspan="3">Equivalent ECTS</td><td colspan="3">Required SWL</td></tr>
<tr><td colspan="12">Course Content</td></tr>
<tr><td colspan="12">Forecasting and time series analysis (qualitative techniques: Sales force polling,, Customers' opinion, Delphi technique, Quantitative techniques: Smoothing methods, Averaging Methods, Linear regression), Capacity planning(defining capacity, rough-cut capacity planning, detailed capacity planning), Aggregate production planning, Inventory management and control (determining optimal order quantity, optimal production quantity, safety stock), Materials requirement planning, Work loading and scheduling.</td></tr>
<tr><td colspan="12">Used in Program / Level</td></tr>
<tr><td colspan="8">Program Name or requirement</td><td colspan="4">Study Level</td></tr>
<tr><td colspan="8">Design and Production Engineering Program</td><td colspan="4">4</td></tr>
<tr><td colspan="12">Assessment Criteria</td></tr>
<tr><td colspan="3">Student Activities</td><td colspan="3">Mid-Term Exam</td><td colspan="3">Practical Exam</td><td colspan="3">Final Exam</td></tr>
<tr><td colspan="3">35%</td><td colspan="3">25%</td><td colspan="3">0%</td><td colspan="3">40%</td></tr>
<tr><td colspan="3">Exam Duration [Hours]</td><td colspan="3">1.5 Hrs</td><td colspan="3"></td><td colspan="3">3Hrs</td></tr>
<tr><td colspan="12">Equivalent to other course in another university</td></tr>
<tr><td colspan="3">University</td><td colspan="9">N/A</td></tr>
<tr><td colspan="3">Course code and title</td><td colspan="9">N/A</td></tr>
</table>

2. Course Aims

Overall aims of course

The main objective of this course is to provide students with a broad understanding and knowledge of operations management concepts, methods and tools used in both service-oriented and product-oriented organizations to gain a competitive edge.

By the end of the course the students will be able to:

- Demonstrate knowledge on production planning and control systems in industrial environment
- Develop mathematical models describing actual and hypothetical production systems to the optimal utilization of resources

- Solve production and operation management problems
- Work in teams to formulate and solve real life case studies

3. Program Competencies Served by Course.

A: Faculty Requirements

- A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.
- A5. Practice research techniques and methods of investigation as an inherent part of learning.
- A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.

C: Faculty Requirements

- C3. Implement basics of industrial engineering to analyze, plan and design production systems.
- C5b. Demonstrate additional abilities to analyze, design, integrate, operate, evaluate, control, automate, and implement methods and techniques to manage industrial systems.

4. Learning Outcomes (LOs)

a.	Knowledge and understanding
a1	Understand the different sources of qualitative forecasts and know how to apply the mathematical methods used in forecasting
a2	Understand the concepts of aggregate planning and the use of different techniques including linear programming models in determining optimal resource allocations
a3	Appreciate the strategies available for aggregate planning and the different models that can be used for decision making
a4	Be able to calculate economic lot sizes using EOQ, EPQ and risk models
a5	Be aware of expedient inventory methods, ABC analysis, and perpetual and period inventory management systems
a6	Realize the importance of systems thinking and how material management interacts with the rest of the production system
a7	Understand the philosophy of JIT and the nature of Kanban. Realize the significant impact that JIT applications have had on production management
a8	Be able to distinguish the features of pull- and push- manufacturing systems
a9	Know how to use critical ratios to set priorities, Gantt chart for scheduling and monitoring
b.	Intellectual skills
b1	Analyze the components of the production system and evaluate the sufficiency of resources.
b2	Improve capability in formulating industrial production planning and control problems.
b3	Improve capability in using computer for solving problems
b4	N/A
c.	Professional and practice skills
c1	Apply different mathematical methods and operation research techniques in solving practical case studies

c2	N/A
c3	N/A
c4	N/A
d.	General and transferable skills
d1	Improve team work skills through term projects
d2	Improve report writing and presentation skill
d3	N/A
d4	N/A

Cognitive Domain	
1	Comprehend the concepts of Operations Management which include, Capacity planning, Aggregate production planning, Inventory management and control, Materials requirement planning, Work loading and scheduling.
2	Applies what was learned in the fields of operations management to solve real life problems into novel situations in the work place
	N/A
Psychomotor Domain	
3	Demonstrate effective and persuasive communication skills in presentation
	N/A
	N/A
Affective Domain	
4	Cooperates in group activities (displays teamwork). Displays a professional commitment to ethical practice on a daily basis.
5	Accepts professional ethical standards
	N/A

5. Course LOs Mapping with Level of Competencies

LOs	Competences				
	A1	**A5**	**A10**	**C3**	**C5b**
Cognitive Domain					
1	●	●	●		
2	●	●	●	●	●
3	●	●	●	●	●
Psychomotor Domaine					
4	●			●	●
Affective Domaine					
5		●	●	●	●
6			●		●

6. Assessment and Feedback Strategy

- Formative Assessment Methods:
  - In-Class Discussion
- Summative Assessment Methods:
  - Assignments.
  - Case studies
  - Quizzes.

- Written Exams (Midterm and Final Exams).

7. Teaching and Learning Methods

- Interactive Lectures
- Self-Readings
- Problem Solving and case studies from industry
- Collaborating learning (Team Project)

8. List of References

- Stevenson, W. Operations Management (2020). 14th edition, New York: McGraw-Hill/Irwin ISBN10: 126023889X, ISBN13: 978126023889.
- F. Robert Jacobs and Richard Chase (2020). Operations and Supply Chain Management.16th Edition. New York: McGraw-Hill. ISBN10: 1260238903 ISBN13: 9781260238907.
- Heizer, Jay; Render, Barry; Munson, Chuck (2017). Operations Management: Sustainability and Supply Chain Management, 12th ed, England. Pearson Education Limited.

9. Study Plan

Week	Course Content	Lecture Hours	Tutorial Hours
1	Introduction to Production/Operation Management	1	
2	Forecasting and Time Series Analysis	6	6
3	Resource Requirement Planning	2	3
4	Inventory Policy and Management	6	6
5	Aggregate Production Planning and Master Scheduling	4	4
6	Material Requirements Planning	3	3
7	Just In Time Systems	2	2
8	Operation Scheduling and Production Control	6	6
	Total Hours	**30**	**30**

1. Course Content / LOs Matrix

Topic	Course Content	1	2	3	4	5
1	Introduction to Production/Operation Management	●	●		●	
2	Forecasting and Time Series Analysis	●	●	●	●	●
3	Resource Requirement Planning	●	●	●	●	●
4	Inventory Policy and Management	●	●	●	●	●
5	Aggregate Production Planning and Master Scheduling	●	●	●	●	
6	Material Requirements Planning	●	●	●	●	●
7	Just In Time Systems	●	●	●	●	●
8	Operation Scheduling and Production Control	●	●	●	●	

2. Assessment and Feedback Strategies / LOs Matrix

Assessment	1	2	3	4	5
Assignments		●	●		
In Class Discussion	●		●	●	●
Case studies		●	●	●	●
Quizzes		●	●		
Mid-Term Exam	●	●	●		
Final Exam	●	●	●		

3. Written Exams Teaching & Learning Methods / LOs Matrix

Learning Method	1	2	3	4	5
Interactive Lectures	●	●	●		
Self-Readings and case studies	●	●	●		●
Problem Solving (Assignments)			●	●	

Course Specification

1. Basic Information

MDP433	Quality Control		3 CH
Prerequisites	Probability and statistics		
Number of weekly Contact Hours			
Lecture	Tutorial	Laboratory	
2	2	0	
Required SWL	125	Equivalent ECTS	5
Course Content			
History of quality control Quality definitions and concepts, Process capability analysis, Theory of control charts, Statistical control charts for attributes, Statistical control charts for variables, Acceptance sampling: Principles and concepts, Acceptance sampling by attributes, Acceptance sampling by variables.			
Used in Program / Level			
Program Name or requirement	Study Level		
Design and Production Engineering Program	4		
Manufacturing Engineering Program	4		
Assessment Criteria			
Student Activities	Mid-Term Exam	Practical Exam	Final Exam
35%	25%	0%	40%

2. Course Aims

By the end of the course the students will be able to:

- Apply different statistical quality control techniques to various manufacturing and service applications to control, monitor, and improve products/services quality.

3. Program Competencies Served by Course.

- A: Faculty Requirements (A2)
  - A2: Develop and conduct appropriate experimentation and/or simulation, analyse and interpret data, assess, and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.

- B: Discipline Competences (Bm4)
  - Bm4: Adopt suitable national and international standards and codes; and integrate legal, economic and financial aspects to: design, build, operate, inspect and maintain mechanical equipment and systems.

- C: Program Competences (C5b)
    - C5b. Demonstrate additional abilities to analyse, design, integrate, operate, evaluate, control, automate, and implement methods and techniques to manage industrial systems.

4. Learning Outcomes (LOs)

Cognitive Domain	
1	Explains the concepts of quality, quality improvement, control charts, and acceptance sampling
2	Identifies different quality improvement tools, needed to enhance the manufacturing process.
	N/A
Psychomotor Domaine	
3	Manipulates different applications of a related software tool.
	N/A
	N/A
Affective Domaine	
4	Displays a professional commitment to ethical practice by appreciating self-reliance or/and group activities to objectively approach problem solving.
	N/A
	N/A

5. Course LOs Mapping with Level of Competencies

LOs	Competences		
	A2	**Bm4**	**C5b**
Cognitive Domain			
1			●
2	●	●	
Psychomotor Domaine			
3	●		●
Affective Domaine			
4	●	●	

6. Assessment and Feedback Strategy

- Assignments (formative/summative in the form of solving problems)
- Report
- Written examinations

7. Teaching and Learning Methods

- Interactive Lectures
- Interactive Tutorials
- Self-reading

8. List of References

1. Introduction to Statistical Quality Control, 8th Edition by Douglas C. Montgomery, 2019, John Wiley & Sons, Inc. ISBN: 978-1-119-39930-8.
2. Dale H. Besterfielf, "Quality Improvement" 9th edition, Pearson, 2013.
3. Besterfield, D., Quality Improvement, 9th ed. New Jersey: Pearson Education Inc., 2013.
4. J.M. Juran, Frank M. Gryna, Jurans Quality Control Handbook: McGraw-Hill Education; 6thed., 2010
5. Lind, D., Marchal, W., and Wathen, S., Statistical Techniques in Business and Economics, 15thed., 2012, McGraw-Hill Education

Web sites:

www.asq.org.

9. Study Plan

No	Course Content	Lecture (hrs)	Tutorial (hrs)
1	Introduction (introducing new terminologies, quality definitions and concepts, process control vs process capability, etc.)	**2x3**	**2x3**
2	Quality costs and history of quality improvement	**2**	**2**
3	DMAIC as a decision-making tool	**2**	**2**
4	Statistical Process Control philosophy and techniques (the magnificent seven SPC problem-solving tools)	**2**	**2**
5	Theory of control charts and variations	**2**	**2**
6	Control Charts for Variables	**2x3**	**2x3**
7	Control Charts for Attributes	**2**	**2x2**
8	Acceptance Sampling	**2x4**	**2x3**
Total Number of Hours		**30**	**30**

10. Course Content / LO Matrix

Course Content	1	2	3	4
Introduction (introducing new terminologies, quality definitions and concepts, process control vs process capability, etc.)	x	x		
Quality costs and history of quality improvement	x			
DMAIC as a decision-making tool	x			x
Statistical Process Control philosophy and techniques (the magnificent seven SPC problem-solving tools)	x	x		x
Theory of control charts and variations	x			x
Control Charts for Variables		x	x	x
Control Charts for Attributes		x	x	x
Acceptance Sampling	x	x	x	x

11. Assessment and Feedback Strategies / LOs Matrix

Assessment	1	2	3	4
Assignments (solving problems) and report	x	x	x	x
Mid Term	x			
Quizzes	x	x		
Final Exam		x		

12. Teaching and Learning Methods / LO Matrix

Learning Method	1	2	3	4
Interactive Lectures	x	x		x
Interactive Tutorial Sessions	x	x	x	x
Self-reading		x	x	x

Course Specification

1. Basic Information

<table>
<tr><td colspan="2">MDP411</td><td colspan="8">Introduction to Finite Elements</td><td colspan="2">3 CH</td></tr>
<tr><td colspan="2">Prerequisites</td><td colspan="10">Differential Equations and Numerical Analysis or Engineering Mathematics, Machine Construction</td></tr>
<tr><td colspan="12">Number of weekly Contact Hours</td></tr>
<tr><td colspan="4">Lecture</td><td colspan="4">Tutorial</td><td colspan="4">Laboratory</td></tr>
<tr><td colspan="4">2</td><td colspan="4">2</td><td colspan="4">0</td></tr>
<tr><td colspan="3">Required SWL</td><td colspan="3">125</td><td colspan="3">Equivalent ECTS</td><td colspan="3">5</td></tr>
<tr><td colspan="12">Course Content</td></tr>
<tr><td colspan="12">Overview and Introduction to Variational Methods, Bar Problem, Truss problem, Two-dimensional plate problem: Plane stress, Plane strain, Numerical integration, Beam bending problem, MATLAB programming of all problems, FE Applications Using Software Packages, Eigenvalue Problems (Structural Dynamics/Buckling of Beams)</td></tr>
<tr><td colspan="12">Used in Program / Level</td></tr>
<tr><td colspan="8">Program Name or requirement</td><td colspan="4">Study Level</td></tr>
<tr><td colspan="8">Program #1: Design and Production Engineering Program</td><td colspan="4">4</td></tr>
<tr><td colspan="8">Program #2: Mechanical Power Engineering Program</td><td colspan="4">4</td></tr>
<tr><td colspan="8">Program #4: Mechatronics Engineering Program</td><td colspan="4">4</td></tr>
<tr><td colspan="8">Program #12: Materials Engineering Program</td><td colspan="4">3</td></tr>
<tr><td colspan="12">Assessment Criteria</td></tr>
<tr><td colspan="3">Student Activities</td><td colspan="3">Mid-Term Exam</td><td colspan="3">Practical Exam</td><td colspan="3">Final Exam</td></tr>
<tr><td colspan="3">50%</td><td colspan="3">20%</td><td colspan="3">0%</td><td colspan="3">30%</td></tr>
<tr><td colspan="3">Exam Duration [Hours]</td><td colspan="3">1</td><td colspan="3"></td><td colspan="3">2</td></tr>
<tr><td colspan="12">Equivalent to other course in another university</td></tr>
<tr><td colspan="3">University</td><td colspan="9"></td></tr>
<tr><td colspan="3">Course code and title</td><td colspan="9"></td></tr>
</table>

2. Course Aims

The aim of this course is to provide students with the theoretical and practical knowledge needed to conduct a Finite Element analysis for mechanical systems and structures in specific. At the end of the course, students should be able to apply this knowledge to develop Finite Element models and use them to predict the deformations and stresses of mechanical structures under static and dynamic loading conditions.

3. Program Competencies Served by Course.

A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.

A2. Develop and conduct appropriate experimentation and/or simulation, analyse and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.

A3. Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.

B1m. Model, analyse and design physical systems applicable to the specific discipline by applying the concepts of: Thermodynamics, Heat Transfer, Fluid Mechanics, solid Mechanics, Material Processing, Material Properties, Measurements, Instrumentation, Control Theory and Systems, Mechanical Design and Analysis, Dynamics and Vibrations.

C5a. Demonstrate additional abilities to model, analyse, and design mechanical components and systems using the most up-to-date tools of integrated systems.

4. Learning Outcomes - LOs

Cognitive Domain	
1	Use appropriate types of Finite Elements for specific problems in Mechanical Design.
2	Analyze components and structures using Finite Elements Analysis.
Psychomotor Domain	
3	Develop codes and simulation models for problems in mechanical design.
Affective Domain	
4	Realize the role of mechanical engineer in applications and beware of the limitations of analytical methods.

5. Course LOs Mapping with Level of Competencies

LOs	Level of Competences				
	A1	A2	A3	B1m	C5a
Cognitive Domain					
1	✔	✔	✔	✔	
2	✔	✔	✔	✔	✔
Psychomotor Domain					
3	✔	✔	✔	✔	
Affective Domain					
4	▯		✔	✔	✔

6. Assessment and Feedback Strategy

- Assignments 20%
- Quizzes 30%
- Midterm 20%
- Final 30%

7. Teaching and Learning Methods

- Lectures
- Tutorials

8. List of References

- Lecture notes, 2021.
- Elsabbagh Adel, Introduction to Finite Element Modeling for Engineers, Registration Number 2016/16360, Egyptian National Library and Archives, 2016.
- Reddy J, An introduction to the finite element method. 2nd ed. McGraw-Hill, New York, 1993.
- Zienkiewicz O, Taylor R, The finite element method: Basics 4th ed. Butterworth-Heinemann, Oxford Auckland Boston Johannesburg Melbourne New Delhi, 2000.
- Zienkiewicz O, Taylor R, The finite element method: solid mechanics 4th ed. Butterworth-Heinemann, Oxford Auckland Boston Johannesburg Melbourne New Delhi, 2000.

9. Study Plan

No.	Course Content	Lecture Hours	Tutorial Hours
1	Introduction to Finite Element Modeling	2	2
2	Overview and Introduction to Variational Methods	4	4
3	FE modeling of Bar Problem	2	2
4	FE modeling of trusses	2	2
5	Two dimensional plane stress plate problem	6	6
6	Numerical Integration	2	2
7	Beams and Plates Bending Problems	2	2
8	MATLAB programming of all problems	4	4
9	FE Applications Using Software Packages	4	4
10	Eigenvalue problems (dynamics/buckling)	2	2
Total Number of Hours		30	30

10. Course Content / LOs Matrix

No	Course Content	1	2	3	4
1	Introduction to Finite Element Modeling				✔
2	Overview and Introduction to Variational Methods				✔
3	FE modeling of Bar Problem	✔	✔		
4	FE modeling of trusses	✔	✔		
5	Two dimensional plane stress plate problem	✔	✔		
6	Numerical Integration	✔	✔		
7	Beams and Plates Bending Problems	✔	✔		
8	MATLAB programming of all problems		✔	✔	
9	FE Applications Using Software Packages		✔	✔	✔
10	Eigenvalue problems (dynamics/buckling)	✔	✔		

11. Assessment and Feedback Strategies / LOs Matrix

Assessment	1	2	3	4
Assignments	✔	✔	✔	✔
Quizzes	✔	✔		✔
Mid-Term Exam	✔	✔		✔
Final Exam	✔	✔	✔	✔

12. Teaching & Learning Methods / LOs Matrix

Learning Method	1	2	3	4
Lectures	✔	✔	✔	✔
Tutorials	✔	✔	✔	

Course Specification

1. Basic Information

MDP411	Noise and Vibration Control		3 CH
Prerequisites	Mechanical Vibrations		
Number of weekly Contact Hours			
Lecture	Tutorial	Laboratory	
2	2	1	
Required SWL	125	Equivalent ECTS	5
Course Content			
Introduction, fields of application, effect of sound and vibration on man and equipment. Fundamental Concepts, Signal Analysis and Measurement Techniques, Vibrations of simple mechanical systems, Continuous systems in 1D, and mode shapes, Introduction to 2-dimensional systems, Building Acoustics and sound propagation outdoors, Sound in Ducts and Flow induced vibrations, Principles of noise and vibration control, Study of the sound and vibration of selected machines, Standards and Regulations.			
Used in Program / Level			
Program Name or requirement	Study Level		
Program #1: Design and Production Engineering Program	4		
Assessment Criteria			
Student Activities	Mid-Term Exam	Practical Exam	Final Exam
20%	20%	0%	60%
Exam Duration [Hours]	1		2
Equivalent to other course in another university			
University			
Course code and title			

2. Course Aims

By the end of the course the students will be able to analytically and experimentally apply the knowledge and skills gained to the construction of quiet and vibration-free constructions such as vessels, machines, and processes as well as be capable to determining and minimizing the sound and vibration fields that arise in various environments.

3. Program Competencies Served by Course.

A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.

A2. Develop and conduct appropriate experimentation and/or simulation, analyse and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.

A3. Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.

B4m. Adopt suitable national and international standards and codes to design, build, operate, inspect and maintain mechanical equipment and systems.

C5a. Demonstrate additional abilities to model, analyse, and design mechanical components and systems using the most up-to-date tools of integrated systems.

4. Learning Outcomes - LOs

Cognitive Domain	
1	Quantify acoustical quantities using appropriate physical quantities.
2	Apply the basics of Signal Analysis to analyze acoustic fields.
Psychomotor Domain	
3	Measure and analyze sound and vibration signals
Affective Domain	
4	Beware of the problems resulting from environmental and industrial noise.

5. Course LOs Mapping with Level of Competencies

LOs	Level of Competences				
	A1	A2	A3	B4m	C5a
Cognitive Domain					
1	✓	✓	✓	✓	▯
2	✓	✓	✓	✓	✓
Psychomotor Domain					
3	✓	✓	✓	✓	✓
Affective Domain					
4	▯	✓	✓	✓	✓

6. Assessment and Feedback Strategy

- Assignments 10%
- Lab reports 10%
- Midterm 20%
- Final 60%

7. Teaching and Learning Methods

- Lectures
- Tutorials
- Laboratories

8. List of References

- Lecture notes.
- F. J. Fahy, Foundation of Engineering Acoustics, Academic Press 2001.
- D. A. Bies and C. H. Hansen, Engineering Noise Control; Theory and practice, third edition, E & FN Spon, 2003.
- F.J. Fahy and J.G. Walker, Advanced Applications in Acoustics, Noise and Vibration, Spon Press, 2004.

9. Study Plan

No.	Course Content	Lecture Hours	Tutorial Hours	Lab Hours
1	Basics and Acoustical Quantities	4	4	2
2	Signal Analysis and Filters	2	2	1
3	Analysis of Simple Mechanical Systems	4	4	2
4	Wave Equation	2	2	1
5	Measurement Techniques	4	4	2
6	Building Acoustics	2	2	1
7	Sound in Ducts	2	2	1
8	Noise and Vibration Control	4	4	2
9	Sound & Vibration of Selected Machines	4	4	2
10	Standards and Regulations	2	2	1
Total Number of Hours		30	30	15

10. Course Content / LOs Matrix

No	Course Content	1	2	3	4
1	Basics and Acoustical Quantities	✔	✔		✔
2	Signal Analysis and Filters	✔	✔		
3	Analysis of Simple Mechanical Systems	✔	✔		
4	Wave Equation	✔	✔		
5	Measurement Techniques			✔	
6	Building Acoustics	✔	✔	✔	✔
7	Sound in Ducts	✔	✔	✔	✔
8	Noise and Vibration Control	✔	✔		✔
9	Sound & Vibration of Selected Machines	✔	✔	✔	✔
10	Standards and Regulations	✔	✔	✔	✔

11. Assessment and Feedback Strategies / LOs Matrix

Assessment	1	2	3	4
Assignments	✔	✔	✔	✔
Lab reports	✔	✔		✔
Mid-Term Exam	✔	✔		✔
Final Exam	✔	✔	✔	✔

12. Teaching & Learning Methods / Los Matrix

Learning Method	1	2	3	4
Lectures	✔	✔	✔	✔
Tutorials	✔	✔		
Labs	✔	✔	✔	✔

Course Specification

1. Basic Information

MDP 413	Design Optimization	**3 CH**
Prerequisites	Differential Equations and Numerical Analysis, Machine Elements Design	

Number of weekly Contact Hours		
Lecture	Tutorial	Laboratory
3	1	1

Required SWL	125	Equivalent ECTS	5

Course Content
Principles of optimization in design process, design variables, objective functions, constraints, optimization problem formulation, optimality criteria and conditions, single-variable optimization, graphical optimization, multivariable optimization without constraints and with constraints, Linear, quadratic, nonlinear and dynamic programming optimization problems. Evolutionary design algorithms for global optimization such as genetic algorithm. Structural Optimization: size optimization, Shape optimization, Topology optimization. Automated design optimization and design exploration. All design optimization examples in this course will be on mechanical structures and machine elements such as cantilevers, beams, coil springs, shafts, pressure vessels, bars, trusses, cross section shapes ...etc

Used in Program / Level	
Program Name or requirement	Study Level
Design and Production Engineering Program requirement	4

Assessment Criteria			
Student Activities	Mid-Term Exam	Practical Exam	Final Exam
20 %	**20%**	**20%**	**40%**

2. Course Aims

This course aims to:

- Determine the principles of optimization in design process using various kinds of programming.
- Use evolutionary design algorithms for global optimization such as genetic algorithm.
- Study the optimization techniques for structural design.

3. Program Competencies Served by Course.

In addition to the competences for all Engineering Programs (A-Level) and the competencies for the Mechanical Discipline (B-Level), the Design and Production Engineering Program graduate must be able to (C-Level):

C2. Design systems, machines, tools, and products implementing proper standards and developing the necessary calculations, construction and working drawings.

C5a. Demonstrate additional abilities to model, analyze, and design mechanical components and systems using the most upto-date tools of integrated systems.

4. Learning Outcomes (LOs)

Cognitive Domain	
1	Break down the principles of optimization in design process.
2	Apply various kinds of programming to solve an optimization problem.
Psychomotor Domain	
3	Follow evolutionary design algorithms for global optimization such as genetic algorithm.
4	Display optimization techniques for structural design.
Affective Domaine	
5	work in ~~Construct and manage a~~ teamwork in a project.
6	follow a project report scientific standards guideline. ~~Present a~~

5. Course LOs Mapping with Level of Competencies

Design & Production Engineering Program

LOs	Competences	
	C2	**C5a**
Cognitive Domain		
1	●	●
2		●
3		●
4		●
Affective Domaine		
5	●	●
6	●	●

6. Assessment and Feedback Strategy

- Assignments and lab reports (online & written)
- Quizzes (online & written)
- Written examinations (midterm & final term)

7. Teaching and Learning Methods

- Lectures (on campus & online using Microsoft Teams platform)
- Tutorial (on campus & online using Microsoft Teams platform)
- Lab (on campus & online using Microsoft Teams platform)

8. List of References

a. Essential books (textbooks)

- Krishnan Suresh, “Design Optimization using MATLAB and SOLIDWORKS", Cambridge University Press (2021).
- Garret N. Vanderplaats, “Numerical Optimization Techniques for Engineering Design: With Applications”, MCGRAW HILL SERIES IN MECHANICAL ENGINEERING, 1984.

b. Recommended books

- Martin Philip Bendsoe and Ole Sigmund, “Topology Optimization”, 2nd edition Springer; (2002)

9. Study Plan

No.	Course Content	Lect.	Tut.	Lab.	Total
1	Design Optimization Process Overview	6	2	2	10
2	Modelling and Simulation	6	2	2	10
3	Programming	15	5	5	25
4	Algorithms for Global Optimization	6	2	2	10
5	System Design Optimization	6	2	2	10
6	Design Optimization Case Studies	6	2	2	10
Total Number of Hours		45	15	15	75

Experiments List

- Optimization Tools Overview.
- Modelling and Simulation.
- Programming.
- Algorithms for Global Optimization.
- Case Studies.

10. Course Content / LOs Matrix

Topic	Course Content	1	2	3	4	5	6
1	Design Optimization Process Overview	●	●	●		●	●
2	Modelling and Simulation	●	●			●	●
3	Programming	●	●			●	●

4	Algorithms for Global Optimization	●		●		●	●
5	System Design Optimization	●	●	●	●	●	●
6	Design Optimization Case Studies	●	●	●	●	●	●

11. Assessment and Feedback Strategies / LOs Matrix

Assessment Method	1	2	3	4	5	6
Assignments and reports	●	●	●	●	●	●
Quizzes	●	●	●	●		
Mid-Term	●	●	●	●		
Final Exam	●	●	●	●		

12. Teaching & Learning Methods / LOs Matrix

Learning Method	1	2	3	4	5	6
Lecture	●	●	●	●		
Tutorial	●	●	●	●	●	●
Lab	●	●	●	●	●	●
Self-learning	●	●	●	●	●	●

Course Specification

1. Basic Information

<table>
<tr><td colspan="3">MDP 414</td><td colspan="7">Product Design and Development</td><td colspan="2">3 CH</td></tr>
<tr><td colspan="3">Prerequisites</td><td colspan="9"></td></tr>
<tr><td colspan="12">Number of weekly Contact Hours</td></tr>
<tr><td colspan="4">Lecture</td><td colspan="4">Tutorial</td><td colspan="4">Laboratory</td></tr>
<tr><td colspan="4">2</td><td colspan="4">2</td><td colspan="4">2</td></tr>
<tr><td colspan="3">Required SWL</td><td colspan="3">125</td><td colspan="3">Equivalent ECTS</td><td colspan="3">5</td></tr>
<tr><td colspan="12">Course Content</td></tr>
<tr><td colspan="12">Design methodologies, Product development process, Task clarification, Generic design process (conceptual, embodiment, detail, robust, modular, system). Design for X, DFM, DFA, DFMA. Product design and development – Case studies.</td></tr>
<tr><td colspan="12">Used in Program / Level</td></tr>
<tr><td colspan="8">Program Name or requirement</td><td colspan="4">Study Level</td></tr>
<tr><td colspan="8">Design and Production Engineering Program.</td><td colspan="4">4</td></tr>
<tr><td colspan="12">Assessment Criteria</td></tr>
<tr><td colspan="3">Student Activities</td><td colspan="3">Mid-Term Exam</td><td colspan="3">Practical Exam</td><td colspan="3">Final Exam</td></tr>
<tr><td colspan="3">40%</td><td colspan="3">20%</td><td colspan="3">0%</td><td colspan="3">40%</td></tr>
<tr><td colspan="3">Exam Duration [Hours]</td><td colspan="3">1</td><td colspan="3"></td><td colspan="3">2</td></tr>
<tr><td colspan="12">Equivalent to other course in another university</td></tr>
<tr><td colspan="3">University</td><td colspan="9">Faculty requirement</td></tr>
<tr><td colspan="3">Course code and title</td><td colspan="9"></td></tr>
</table>

2. Course Aims

The aim of this course is to provide students with background necessary to:

- Realize the relation between design and product development.
- Provide an understanding of the interdependence of processing technology, material and product design.
- Develop the ability to select the suitable material-process-design combinations.
- Understand, combine and articulate general criteria related to design and product development.
- Identify, formulate and seek the appropriate solution for product development problems.

3. Program Competencies Served by Course.

A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.

A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.

A3. Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.

C2. Design systems, machines, tools, and products implementing proper standards and developing the necessary calculations, construction and working drawings.

C5a. Demonstrate additional abilities to model, analyze, and design mechanical components and systems using the most up-to-date tools of integrated systems.

4. Learning Outcomes - LOs

Cognitive Domain	
1	Apply the generic design process for product development.
2	Design and develop products implementing proper standards.
Psychomotor Domain	
3	Implement a design project using design for X.
Affective Domain	
4	Demonstrate the design methodologies used to develop products.

5. Course LOs Mapping with Level of Competencies

ILOs	Level of Competences				
	A1	A2	A3	C2	C5a
Cognitive Domain					
1	✓		✓	✓	✓
2	✓	✓		✓	✓
Psychomotor Domain					
3		✓		✓	✓
Affective Domain					
4				✓	✓

6. Assessment and Feedback Strategy

- Assignments 15%
- Lab reports 10%
- Quizzes 15%
- Midterm 20%
- Final 40%

7. Teaching and Learning Methods

- Online interactive Lectures
- Online interactive tutorials
- Face to face tutorials
- Project based learning

8. List of References

- Materials and Design, The art and design of material selection in product design, Mike Ashby and Kara Johnson, Butterworth-Heinemann, Elsevier Science, 2002.
- Engineering Design, A Systematic Approach, Third Edition, Springer, G. Pahl and W. Beitz, ISBN 3-540-19917-9, 2007.
- Design for Manufacturing and Assembly, O. Molly et al, SPRINGER-SCIENCE+BUSINESS MEDIA, B.V, ISBN 978-1-4613-7650-7 ISBN 978-1-4615-5785-2 (eBook), DOI 10.1007/978-1-4615-5785-2, 1998.
- Innovation in Product Design, From CAD to Virtual Prototyping, Monica Bordegoni and Caterina Rizzi, ISBN 978-0-85729-774-7 e-ISBN 978-0-85729-775-4, DOI 10.1007/978-0-85729-775-4, Springer London Dordrecht Heidelberg New York, Springer-Verlag London Limited 2011.
- Product Design and Development, Karl T. Ulrich and Steven D. Eppinger, Published by McGraw-Hill Education, 2 Penn Plaza, New York, NY 10121. Copyright, ISBN 978-0-07-802906-6, 2016.

9. Study Plan

No.	Course Content	Lecture Hours	Tutorial Hours	Lab Hours
1	Introduction.	2	1	
2	Design Methodologies and Product development.	4	3	4
3	Industrial design and Product development.	5	4	4
4	Drawing Techniques for Designers.	2	4	
5	Product planning, clarifying the Task, Formulation, list of requirements.	2	2	
6	Product design for primary, secondary shaping processes and for joining.	2	2	4
7	Product design for castings and machining.	2	3	4
8	Product design for X, DFMA, DFA, ….	4	4	5
9	Ergonomic Product design.	2	2	4
10	Systematic design.	2	1	
11	Reverse Engineering versus forward engineering, RE as a product development tool.	3	4	5
Total Number of Hours		**30**	**30**	**30**

No	Title of Experiment	Laboratory Hours
1	Applications on drawing techniques.	2
2	Development of an Aero Walker.	4
3	Development of a Geared screw jack.	4
4	Practical applications for Snap fits.	3

5	Re-design of a Leap chair.	3
6	Development of a Bulldozer bucket to minimize deflections and stresses.	4
7	Development of a Ball valve to reduce the number of its components.	5
8	Case study - Design a product with consideration of manufacturability and assembly and estimate manufacturing costs.	5
	Total Number of Hours	**30**

10. Course Content / LOs Matrix

No	Course Content	1	2	3	4
1	Introduction.	✓		✓	✓
2	Design Methodologies and Product development.	✓		✓	
3	Industrial design and Product development.	✓			✓
4	Drawing Techniques for Designers.	✓	✓		✓
5	Product planning, clarifying the Task, Formulation, list of requirements.	✓		✓	✓
6	Product design for primary, secondary shaping processes and for joining.	✓	✓		✓
7	Product design for castings and machining.	✓	✓	✓	✓
8	Product design for X, DFMA, DFA, ….	✓	✓		✓
9	Ergonomic Product design.	✓	✓		✓
10	Systematic design.	✓	✓	✓	✓
11	Reverse Engineering versus forward engineering, RE as a product development tool.	✓	✓	✓	✓

11. Assessment and Feedback Strategies / LOs Matrix

Assessment	1	2	3	4
Assignments	✓	✓		✓
Lab reports	✓		✓	
Quizzes	✓	✓		✓
Mid-Term Exam	✓	✓	✓	✓
Final Exam	✓	✓	✓	✓

12. Teaching & Learning Methods / LOs Matrix

Learning Method	1	2	3	4
Lectures	✓	✓	✓	✓
Tutorials	✓	✓		✓
Labs	✓		✓	

Course Specification

1. Basic Information

<table>
<tr><td colspan="3">MDP 415</td><td colspan="7">Selected topics in Mechanical Design</td><td colspan="2">3 CH</td></tr>
<tr><td colspan="3">Prerequisites</td><td colspan="9">Mechanical System Design</td></tr>
<tr><td colspan="12">Number of weekly Contact Hours</td></tr>
<tr><td colspan="4">Lecture</td><td colspan="4">Tutorial</td><td colspan="4">Laboratory</td></tr>
<tr><td colspan="4">2</td><td colspan="4">2</td><td colspan="4">1</td></tr>
<tr><td colspan="3">Required SWL</td><td colspan="3">125</td><td colspan="3">Equivalent ECTS</td><td colspan="3">5</td></tr>
<tr><td colspan="12">Course Content</td></tr>
<tr><td colspan="12">Contemporary topics in mechanical design, Multi-objective design, Design for X, Design optimization, Innovation in mechanical design, software and hardware tools for mechanical design, Design standardization, etc.</td></tr>
<tr><td colspan="12">Used in Program / Level</td></tr>
<tr><td colspan="8">Program Name or requirement</td><td colspan="4">Study Level</td></tr>
<tr><td colspan="8">Design and Production Engineering Program concentration</td><td colspan="4">4</td></tr>
<tr><td colspan="12">Assessment Criteria</td></tr>
<tr><td colspan="3">Student Activities</td><td colspan="3">Mid-Term Exam</td><td colspan="3">Practical Exam</td><td colspan="3">Final Exam</td></tr>
<tr><td colspan="3">40%</td><td colspan="3">20%</td><td colspan="3">0%</td><td colspan="3">40%</td></tr>
<tr><td colspan="3">Exam Duration [Hours]</td><td colspan="3">1</td><td colspan="3"></td><td colspan="3">2</td></tr>
<tr><td colspan="12">Equivalent to other course in another university</td></tr>
<tr><td colspan="3">University</td><td colspan="9">N/A</td></tr>
<tr><td colspan="3">Course code and title</td><td colspan="9">N/A</td></tr>
</table>

2. Course Aims

The aim of this course is to provide students with background necessary to:

- Understand of the fundamental principles of a timely topic in mechanical design.
- Realize the multi-objective design concepts.
- Estimate the terms of Design for Excellence (DFX).
- Determine the optimality conditions for a given design.
- Use software for modeling and dimensioning.
- Select design standardization that provides the objectives of design.

3. Program Competencies Served by Course.

A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.

A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.

A3. Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.

C2. Design systems, machines, tools, and products implementing proper standards and developing the necessary calculations, construction and working drawings.

C5a. Demonstrate additional abilities to model, analyze, and design mechanical components and systems using the most up-to-date tools of integrated systems.

4. Learning Outcomes - LOs

Cognitive Domain	
1	Apply terminologies and definitions related to design by selecting optimal conditions.
2	Design mechanical components and products implementing proper standards.
Psychomotor Domain	
3	Implement a design project using design for X.
Affective Domain	
4	Demonstrate the design methodologies used to develop mechanical components.

5. Course LOs Mapping with Level of Competencies

ILOs	Level of Competences				
	A1	A2	A3	C2	C5a
Cognitive Domain					
1	✓		✓	✓	✓
2	✓	✓		✓	✓
Psychomotor Domain					
3		✓		✓	✓
Affective Domain					
4				✓	✓

6. Assessment and Feedback Strategy

- Assignments 15%
- Lab reports 10%
- Quizzes 15%
- Midterm 20%
- Final 40%

7. Teaching and Learning Methods

- Online interactive Lectures
- Online interactive tutorials
- Face to face tutorials
- Project based learning

8. List of References

- Materials and Design, The art and design of material selection in product design, Mike Ashby and Kara Johnson, Butterworth-Heinemann, Elsevier Science, 2002.
- Design for Manufacturing and Assembly, O. Molly et al, SPRINGER-SCIENCE+BUSINESS MEDIA, B.V, ISBN 978-1-4613-7650-7 ISBN 978-1-4615-5785-2 (eBook), DOI 10.1007/978-1-4615-5785-2, 1998.
- Innovation in Product Design, From CAD to Virtual Prototyping, Monica Bordegoni and Caterina Rizzi, ISBN 978-0-85729-774-7 e-ISBN 978-0-85729-775-4, DOI 10.1007/978-0-85729-775-4, Springer London Dordrecht Heidelberg New York, Springer-Verlag London Limited, 2011.
- Product Design and Development, Karl T. Ulrich and Steven D. Eppinger, Published by McGraw-Hill Education, 2 Penn Plaza, New York, NY 10121. Copyright, ISBN 978-0-07-802906-6, 2016.
- Design Theory and Methods Using CAD/CAE, Kuang H. C., Elsevier Inc., ISBN: 978-0-12-398512-5, 2015.
- Multi objective Optimization in Theory and Practice I: Classical Methods, Andre A. Keller, DOI: 10.2174/97816810856851170101, ISBN: 978-1-68108-569-2, 2017.

9. Study Plan

No.	Course Content	Lecture Hours	Tutorial Hours	Lab Hours
1	Introduction to selected topics in mechanical design.	2	1	
2	Introduction to Design optimization.	4	3	3
3	Industrial design.	5	4	5
4	Drawing Techniques for Designers.	2	4	
5	Product design for X, DFMA, DFA, ….	2	2	
6	Reverse Engineering versus forward engineering, RE as a product development tool.	2	2	4
7	Hydrostatic Bearings.	2	3	4
8	Design for creep.	2	4	5
9	Design for fatigue strength.	2	2	4
10	Design for thermal stresses.	2	1	
11	Design for joining.	3	3	5
12	Fracture mechanics.	2	1	
Total Number of Hours		**30**	**30**	**30**

No	Title of Experiment	Laboratory Hours
1	Design optimization for a geared unit.	2
2	Industrial design for the Sinclair C5 car.	4
3	Development of a Geared screw jack.	4
4	Development of a ball valve for minimum components.	3
5	Practical applications for Snap fits.	3
6	Reverse engineering of a Bulldozer bucket.	4
7	Re-design of a pump for X conditions.	5
8	Design of a selected product with consideration of manufacturability and assembly.	5
Total Number of Hours		**30**

10. Course Content / LOs Matrix

No	Course Content	1	2	3	4
1	Introduction to selected topics in mechanical design.	✓		✓	✓
2	Introduction to Design optimization.	✓		✓	
3	Industrial design.	✓			✓
4	Drawing Techniques for Designers.	✓	✓		✓
5	Product design for X, DFMA, DFA, ….	✓		✓	✓
6	Reverse Engineering versus forward engineering, RE as a product development tool.	✓	✓		✓
7	Hydrostatic Bearings.	✓	✓	✓	✓
8	Design for creep.	✓	✓		✓
9	Design for fatigue strength.	✓	✓		✓
10	Design for thermal stresses.	✓	✓	✓	✓
11	Design for joining.	✓	✓	✓	✓
12	Fracture mechanics.	✓		✓	✓

11. Assessment and Feedback Strategies / LOs Matrix

Assessment	1	2	3	4
Assignments	✓	✓		✓
Lab reports	✓		✓	
Quizzes	✓	✓		✓
Mid-Term Exam	✓	✓	✓	✓
Final Exam	✓	✓	✓	✓

12. Teaching & Learning Methods / LOs Matrix

Learning Method	1	2	3	4
Lectures	✓	✓	✓	✓
Tutorials	✓	✓		✓
Labs	✓		✓	

Course Specification

1. Basic Information

MDP434	Quality Systems and Assurance		3 CH
Prerequisites	Probability and Statistics		
Number of weekly Contact Hours			
Lecture	Tutorial	Laboratory	
2	2	0	
Required SWL	125	Equivalent ECTS	Required SWL
Course Content			
Basic concepts, Definitions, Terminology, Development of quality control systems, Quality systems for: design, development, purchasing, and Planning, Quality organization, Cost of quality, Economics of quality, Training, Quality Management Systems, Quality assurance, Employee participation programs.			
Used in Program / Level			
Program Name or requirement		Study Level	
Design and Production Engineering Program Concentration		4	
Assessment Criteria			
Student Activities	Mid-Term Exam	Practical Exam	Final exam
35%	25%	0%	40%
Exam Duration [Hours]	1		3
Equivalent to other course in another university			
University			
Course code and title			

2. Course Aims

The overall aim of the course is to provide a clear understanding of the quality systems concepts and definitions. To provide the knowledge needed for managing and organizing the quality in any organization or service. To provide the essential information about process control and design, quality costs and quality assurance. Give a clear explanation on the phases and the regulation of a quality system certification process

3. Program Competencies Served by Course.

A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.

A9. Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.

B4m. Adopt suitable national and international standards and codes to design, build, operate, inspect and maintain mechanical equipment and systems.

C3. Implement basics of industrial engineering to analyze, plan and design production systems.

C5b. Demonstrate additional abilities to analyze, design, integrate, operate, evaluate, control, automate, and implement methods and techniques to manage industrial systems.

4. Learning Outcomes - LOs

Cognitive Domain	
1	Examine the principles of quality systems in organizations.
2	Evaluate the significance of historical advancements in the quality movement
3	Describe the requirements and stages of the quality system certification procedure.
4	Recognize the importance of quality in product design, service, innovation, and quick reaction in order to meet customers needs and expectations.
Psychomotor Domain	
5	Use a range of quality improvement tools to enhance processes.
6	Understand and calculate different quality costs.
Affective Domain	
7	Reviewing and summarizing case studies in the service, education and manufacturing industries and discuss their opinion.

5. Course LOs Mapping with Level of Competencies

ILOs	Level of Competences				
	A4	A9	B4m	C3	C5b
Cognitive Domain					
1	✓				
2	✓				
3	✓		✓		
4				✓	
Psychomotor Domain					
5		✓		✓	✓
6				✓	✓
Affective Domain					
7		✓			✓

6. Assessment and Feedback Strategy

- Assignments 25%
- Quizzes 10%
- Midterm 25%
- Final 40%

7. Teaching and Learning Methods

- Online interactive Lectures
- Face to face lectures
- Online interactive tutorials
- Face to face tutorials

8. List of References

- Nessren Mohamed Zamzam, quality systems and assurance, Course Notes, 2020.
- Sower, V. E. (2010). Essentials of quality with cases and experiential exercises. John Wiley & Sons.
- Androniceanu, A. (2017). The three-dimensional approach of Total Quality Management, an essential strategic option for business excellence. Amfiteatru Economic, 19(44), 61-78.

9. Study Plan

No	Course Content	lecture	tutorial	Total
1	Basic concepts: definition; terminology of the quality system	2	2	4
2	Quality function	4	4	8
3	Development and design of systems	2	2	4
4	Quality policies and objectives	4	4	8
5	Quality planning	4	4	8
6	Organization for quality	4	4	8
7	Quality costs	4	4	8
8	Quality tools	2	2	4
9	Quality manuals and quality assurance	4	4	8
	Total Hours	30	30	60

10. Course Content / LOs Matrix

No	Course Content	1	2	3	4	5	6	7
1	Basic concepts: definition; terminology of the quality system	✓						
2	Quality function	✓						
3	History of quality system		✓					
4	Quality policies and objectives				✓			✓
5	Quality planning	✓			✓			
6	Organization for quality	✓			✓			
7	Quality costs	✓					✓	✓
8	Quality tools	✓				✓		✓
9	Quality manuals and quality assurance			✓				

11. Assessment and Feedback Strategies / LOs Matrix

Assessment	1	2	3	4	5	6	7
Assignments				✓			✓
Quizzes	✓	✓	✓	✓			
Mid-Term Exam	✓	✓		✓			
Final Exam	✓	✓	✓		✓	✓	

12. Teaching &Learning Methods / LOs Matrix

Learning Method	1	2	3	4	5	6	7
Lectures	✓	✓	✓	✓	✓		✓
Tutorials	✓	✓		✓		✓	✓

Course Specification

1. Basic Information

<table>
<tr><td>MDP256</td><td colspan="4">Phase Transformation and heat treatment</td><td>3 CH</td></tr>
<tr><td>Prerequisites</td><td colspan="5">Metallurgy and Material testing or Crystalline Structures of Materials</td></tr>
<tr><td colspan="6">Number of weekly Contact Hours</td></tr>
<tr><td colspan="2">Lecture</td><td colspan="2">Tutorial</td><td colspan="2">Laboratory</td></tr>
<tr><td colspan="2">2</td><td colspan="2">2</td><td colspan="2">2</td></tr>
<tr><td>Required SWL</td><td>125</td><td colspan="2">Equivalent ECTS</td><td colspan="2">5</td></tr>
<tr><td colspan="6">Course Content</td></tr>
<tr><td colspan="6">The use of heat treatment to produce required metallurgical properties, Cooling curves and equilibrium diagrams, Heat treatment of steels, phase transformation (e.g., martensitic transformations), Hardenability, Strength, and Toughness, Case hardening, Carburizing, and Nitriding, De-carburizing, Re-heat treatment, Re tempering, Annealing, and Normalizing, Heat treatment of Aluminium alloys, Annealing, Solution treatment, Natural ageing, Artificial ageing, Over ageing, Explanation of the heat treatment of Aluminium alloys, Control testing.</td></tr>
<tr><td colspan="6">Used in Program / Level</td></tr>
<tr><td colspan="4">Program Name or requirement</td><td colspan="2">Study Level</td></tr>
<tr><td colspan="4">Materials Engineering Program</td><td colspan="2">2</td></tr>
<tr><td colspan="6">Assessment Criteria</td></tr>
<tr><td>Student Activities</td><td>Mid-Term Exam</td><td colspan="2">Practical Exam</td><td colspan="2">Final Exam</td></tr>
<tr><td>25%</td><td>25%</td><td colspan="2">10%</td><td colspan="2">40%</td></tr>
</table>

2. Course Aims

The aim of this course is to provide students with background necessary to:

The course demonstrates solid state transformation as a key for heat treatment processes which control the properties of materials

3. Program Competencies Served by Course.

- **A:** Faculty Requirements (A1, A2, A3)
  - **A1**: Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.

- **A2:** Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.

- **D:** Program Competences (D1, D2, D6)

  D1. Apply general math, science and engineering skills to the solution of engineering problems related to materials,

  D2. Analyze the relationship between structure, properties, processing and design of materials and their final impact on the product design and performance.

  D6. Adopt suitable national and international standards and codes to: design, build, operate, inspect and maintain industrial equipment and systems.

4. Learning Outcomes (LOs)

a.	Knowledge and understanding
a1	Recognize different types of metallic structure resulting from solidification
a2	Describe the relation between phase diagrams and heat treatment.
a3	Describe equipment and devices used for heat treatment and testing.
a4	Select suitable materials and heat treatment processes for various components.
b.	Intellectual skills
b1	Correlate between the solidification parameters and different metallic structures
b2	Discuss Diffusion process and its effect on phase transformation
b3	Discuss Fick's first and second laws
b4	Discuss TTT diagrams and CT curves
c.	Professional and practice skills
c1	Perform simple calculations to determine the number of vacancies and also diffusion rate in solids
c2	Design different heat treatment processes for ferrous and nonferrous alloys
c3	Conduct heat treatment process
d.	General and transferable skills
d1	Effectively manage tasks, time and resources.
d2	Refer to relevant literature and standards.
d3	Develop creative thinking and problem-solving skills.
d4	Perform scientific discussions.
d5	Work in a team.

Cognitive Domain	
1	Analyze materials performance regarding Heat treatment processes.
2	Select the appropriate heat treatment processes for a specific application.
Psychomotor Domain	
3	Implement heat treatment process
4	NA
Affective Domain	
5	Demonstrate controlling factors affecting heat treatment Techniques.
6	NA

5. Course LOs Mapping with Level of Competencies

A- Materials Engineering Program

LOs	Competences				
	A1	**A2**	**D1**	**D2**	**D6**
Cognitive Domain					
1	●				
2	●		●	●	●
Psychomotor Domain					
3		●	●		
Affective Domain					
5		●	●	●	●

B- Design and production Dept.

LOs	Competences				
	A1	**A2**	**C1**	**C2**	**C3**
Cognitive Domain					
1	●				
2	●		●	●	●
Psychomotor Domain					
3		●	●		
Affective Domain					
5		●	●	●	●

6. Assessment and Feedback Strategy

- Formative Assessment Methods:
  - In-Class Discussion
  - Ask Your Peer
- Summative Assessment Methods:
  - Assignments
  - Quizzes
  - Mid-Term Exam
  - Practical and Oral Exam in Lab
  - Final Exam

7. Teaching and Learning Methods

- Lectures
- Tutorials
- Practical
- Self-learning

8. List of References

- Solid state transformation and heat treatment, Alain Hazotte, Johm Wiley & sons Ltd (Germany), 2004 c
- The Science and engineering of materials, International Edition, Donald R. Askeland & Pradeep P. Phule, Thomason Canada limited, 2006.
- Materials Science and Engineering – An Introduction, William D. Callister, John Wiley and Sons d. Periodicals, Web sites, … etc --- 6- Facilities required for

9. Study Plan

Week	Course Content	Lecture Hours	Tutorial Hours	Lab
1	Solidification of metals and solidification parameters	**2**	**2**	**2**
2	Material selection and attributes Segregation and inclusions	**2**	**2**	**2**
3	Review on crystal structure and defects	**2**	**2**	**2**
4	Arrhenius equipment & Fick's first law	**2**	**2**	**2**
5	Fick's second law	**2**	**2**	**2**
6	Alloying	**2**	**2**	**2**
7	Phase diagram	**2**	**2**	**2**
8	Equilibrium iron carbon phase diagram	**2**	**2**	**2**
9	9 Effect of adding alloying elements	**2**	**2**	**2**
10	Polymorphism	**2**	**2**	**2**
11	TTT and CT curves	**2**	**2**	**2**
12	Martensitic transformation	**2**	**2**	**2**
13	Hardenability of steel and jominy test	**2**	**2**	**2**
14	Technical heat treatment	**2**	**2**	**2**
15	Heat treatment of non-ferrous alloys	**2**	**2**	**2**
Total Number of Hours		**30**	**30**	**30**

Lab	Title of Experiment	Laboratory Hours
1	Cooling curve 1	**3**
2	Cooking curve 2	**3**
3	Phase diagram	**2**
4	Microstructure	**2**
5	Microstructure of steel alloys	**2**
6	Heat treatment 1	**2**
7	Hardening	**3**
8	Softening	**3**
9	Project	**10**
Total Number of Hours		**30**

10. Course Content / ILO Matrix

Wk	Course Content	a1	a2	a3	a4	b1	b2	b3	b4	c1	c2	c3	d1	d2	d3	d4	d5
1	Solidification of metals and solidification parameters	*	*	*	*	*											*
2	Material selection and attributes Segregation and inclusions	*	*	*		*			*		*	*			*		*
3	Review on crystal structure and defects	*	*	*	*	*	*					*	*	*	*	*	
4	Arrhenius equipment & Fick's first law	*	*	*	*	*	*	*		*	*	*	*	*	*	*	
5	Fick's second law	*	*	*	*	*	*					*	*	*	*	*	
6	Alloying	*	*	*	*	*	*	*		*	*	*	*	*	*	*	*
7	Phase diagram	*	*	*	*	*	*					*	*	*	*	*	
8	Equilibrium iron carbon phase diagram																
9	9 Effect of adding alloying elements	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
10	Polymorphism	*	*	*	*	*	*	*	*			*	*	*	*	*	
11	TTT and CT curves	*	*	*	*	*	*		*			*	*	*	*	*	
12	Martensitic transformation	*	*	*	*	*	*	*	*			*	*	*	*	*	
13	Hardenability of steel and jominy test	*	*	*	*	*	*	*	*		*	*	*	*	*	*	
14	Technical heat treatment	*	*	*	*	*	*		*			*	*	*	*	*	
15	Heat treatment of non-ferrous alloys	*	*	*	*	*	*		*			*	*	*	*	*	*

11. Assessment and Feedback Strategies / LOs Matrix

Assessment	**1**	**2**	**3**	**5**
Assignments		●	●	●
Quizzes	●	●	●	
Mid-Term Examination	●	●	●	
Practical Examination		●	●	
Final Examination	●	●	●	

12. Teaching & Learning Methods / LOs Matrix

Learning Method	**1**	**2**	**3**	**5**
Online Lectures	●	●	●	●
Self-Readings	●	●	●	●
Problem Solving	●	●	●	

Course Specification

1. Basic Information

MDP 451	**Failure Analysis**		**3 CH**
Prerequisites	Structures and Properties of Materials		
Number of weekly Contact Hours			
Lecture	Tutorial	Laboratory	
3	0	1	
Required SWL	125	Equivalent ECTS	5
Course Content			
General approaches of Failure Analysis: data and sample collection, preliminary examination, nondestructive inspection, macroscopic and microscopic examination of metallographic sections and fractured surfaces, modes of failure (ductile, brittle) causes of failure (overloads, fatigue, creep, corrosion, wear, elevated temperature failures, etc.), solve the problems of cracks' initiation and propagation, writing a standardized failure technical report, and failure prevention recommendations.			
Used in Program / Level			
Program Name or requirement	Study Level		
Design and Production Engineering Program concentration			
Assessment Criteria			
Student Activities	Mid-Term Exam	Practical Exam	Final Exam
`10%	**10%**	**20%**	**60%**
Exam Duration [Hours]	**3**		
Equivalent to other course in another university			
University	N/A		
Course code and title	N/A		

2. Course Aims

By the end of the course the students will be able to:

- Explain the significance of failure analysis of mechanical parts.
- Select the suitable failure analysis techniques.
- Understand and explain the mechanisms of fracture
- Perform a metallurgical failure analysis.
- Describe the various material factors that cause failure.
- Suggest appropriate corrective and preventive methodology.

3. Program Competencies Served by Course.

A: Faculty Requirements
A2. Develop and conduct appropriate experimentation and/or simulation, analyse and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.

A5. Practice research techniques and methods of investigation as an inherent part of learning.

Disciplinary:

C5c. Demonstrate additional abilities to select, prepare, analyse, treat, and test materials for specific applications

4. Learning Outcomes (LOs)

Cognitive Domain	
1	Understand general procedures, techniques and precautions in failure analysis
2	Analyze the fracture surface under different types of failure
Psychomotor Domain	
3	Follow the general stages/procedure of failure analysis (background- fracture surface preservation- examination----).
Affective Domain	
4	Be aware of basic fracture modes and their characteristics features and suggest appropriate corrective and preventive methodology for a specific component.

5. Course LOs Mapping with Level of Competencies

ILOs	Level of Competences			
	A2	A5	C5c	
Cognitive Domain				
1	✓			
2	✓	✓	✓	
Psychomotor Domain				
3		✓	✓	
Affective Domain				
4			✓	

6. Assessment and Feedback Strategy

- Lab reports and quizzes 10%
- Midterm 10%
- Practical Exam/Project 20%
- Final 60%

7. Teaching and Learning Methods

- Interactive Lectures; [Microsoft Teams platform] and sometimes face to face on campus
- Practical lab activities; [on campus]
- Presentation & In class discussion [on campus]
- Lectures notes were published to students via LMS and recorded via Microsoft Teams platform.

8. List of References

a. Course notes

-Developed by course instructors uploaded to LMS

b. Essential books (textbooks)

- "Metallurgical Failure Analysis: Techniques and Case Studies", Kannadi Palankeezhe Balan, Elsevier Inc., (ISBN 978-0-12-814336-0), https://doi.org/10.1016/C2017-0-01343-5, (2018).
- Understanding How Components Fail, Donald J. Wulpi, Third Edition, ASM international, Materials Park, Ohio, USA, 2013.
- Failure and Damage Analysis of Advanced Materials, Holm Altenbach, Tomasz Sadowski, Springer-Verlag Wien, 2015.
- "Introduction to Failure Analysis and Prevention", James J. Scutti, William J. McBrine, ISBN: 0-87170-704-7, ASM International
- Practical Engineering Failure Analysis, L. L. Faulkner, Tenth Edition, by Marcel Dekker, Inc., New York, NY 10016, U.S.A., 2004

c. Web sites and c. Periodicals, … etc

Journal of Failure Analysis and prevention, ASM international

9. Study Plan

No	Course Content	Lecture (3 hrs.)	Lab (1-hrs.)
1	Introduction: failure and fracture, importance of studying failure, overall procedure of failure analysis	6	1
2	Fracture Mechanics	6	4
3	Techniques of failure analysis	6	2
4	Mechanical failure of materials: fracture modes: features and signs in different scales	6	2
5	General stages/procedure of failure analysis (background- fracture surface preservation- examination---------)	6	----
6	Fractography	6	2
7	Case studies	6	3
8	Failure prevention and recommendations	3	1
Total Number of Hours		45	15

No	Experiment	Lab (1-hrs.)
1	Laboratory safety and regulation	1
2	Study the effect of the crack size, crack position and heat treatment	1
3	Visual Examination (Necked eye + Magnification lens) a. Tensile overload fracture	3

	b. Compression overload fracture c. Bending overload fracture d. Fatigue fracture	
4	Fractography Examination (Stereomicroscope)	3
5	Specimen Preparation for Microstructure Examination	2
6	Microstructure examination (Optical microscope)	2
7	Non-destructive inspection	2
8	Practical exam	1
Total Number of Hours		15

10. Course Content / LOs Matrix

Topic	Course Content	1	2	3	4
1	Introduction: failure and fracture, importance of studying failure, overall procedure of failure analysis	✓			
2	Fracture Mechanics	✓	✓	✓	✓
3	Techniques of failure analysis	✓	✓	✓	✓
4	Mechanical failure of materials: fracture modes: features and signs in different scales	✓	✓	✓	✓
5	General stages/procedure of failure analysis (background- fracture surface preservation- examination---------)	✓	✓	✓	✓
6	Fractography	✓	✓	✓	✓
7	Case studies	✓	✓	✓	✓
8	Failure prevention and recommendations	✓			✓

11. Assessment & Feedback Strategies / LOs Matrix

Assessment Methods	1	2	3	4
Assignments (Reports/Presentation/In class ……	✓	✓	✓	
Lab Activities		✓	✓	
Quizzes (2-4)	✓	✓		✓
Written exams (Mid-Term & Final)	✓	✓		✓

12. Teaching & Learning Methods / LOs Matrix

Learning Methods	1	2	3	4
Lectures	✓	✓	✓	✓
Practical Experiments		✓	✓	✓
Presentation & In class discussion	✓	✓	✓	

Instructor: **Prof. Dr. Hala Abd El-Hakim Hassan**

Course Specification

1. Basic Information

<table>
<tr><td colspan="3">MDP454</td><td colspan="7">Corrosion</td><td colspan="2">3 CH</td></tr>
<tr><td colspan="3">Prerequisites</td><td colspan="9">MDP 151: Structure and properties of materials.
PHM 241: Electrochemistry</td></tr>
<tr><td colspan="12">Number of weekly Contact Hours</td></tr>
<tr><td colspan="4">Lecture</td><td colspan="4">Tutorial</td><td colspan="4">Laboratory</td></tr>
<tr><td colspan="4">3</td><td colspan="4">0</td><td colspan="4">1</td></tr>
<tr><td colspan="3">Required SWL</td><td colspan="3">125</td><td colspan="3">Equivalent ECTS</td><td colspan="3">5</td></tr>
<tr><td colspan="12">Course Content</td></tr>
<tr><td colspan="12">Introduction (thermodynamic and kinetics of corrosion), corrosion types, atmospheric corrosion, principles of corrosion by soil, corrosion by water and steam, localized corrosion, stress corrosion, metallurgical factors affecting corrosion, corrosion at high temperatures, alloy behavior at high temperature, corrosion testing, materials for corrosive environments, coating, fundamental of inhibitors, cathodic protection, analysis of corrosion failure.</td></tr>
<tr><td colspan="12">Used in Program / Level</td></tr>
<tr><td colspan="8">Program Name or requirement</td><td colspan="4">Study Level</td></tr>
<tr><td colspan="8">Design and Production Engineering Program.</td><td colspan="4">4</td></tr>
<tr><td colspan="8">Materials Engineering Program</td><td colspan="4"></td></tr>
<tr><td colspan="12">Assessment Criteria</td></tr>
<tr><td colspan="3">Student Activities</td><td colspan="3">Mid-Term Exam</td><td colspan="3">Practical Exam</td><td colspan="3">Final Exam</td></tr>
<tr><td colspan="3">25%</td><td colspan="3">25%</td><td colspan="3">10%</td><td colspan="3">40%</td></tr>
<tr><td colspan="3">Exam Duration [Hours]</td><td colspan="3">3</td><td colspan="3"></td><td colspan="3"></td></tr>
<tr><td colspan="12">Equivalent to other course in another university</td></tr>
<tr><td colspan="3">University</td><td colspan="9">N/A</td></tr>
<tr><td colspan="3">Course code and title</td><td colspan="9">N/A</td></tr>
</table>

2. Course Aims

Students successfully completing MDP 454 will gain the following:

- Understanding the electrochemical nature of corrosion
- Identifying the different corrosion mechanisms in wet and dry atmospheres.
- Determine the different factors affecting corrosion of metals and alloys.
- Distinguish between the different types of corrosion.
- High temperature oxidation of metals and alloys.
- The different methods used for material protection against corrosion.
- The ability to investigate and analyze the corrosion failures.

3. Program Competencies Served by Course

A: Faculty Requirements
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics;
A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions;
A5. Practice research techniques and methods of investigation as an inherent part of learning;
D: Inter-Disciplinary
D3. Understand systems applicable to the material engineering discipline by applying the concepts of: Thermodynamics, Fluid Mechanics, heat and mass transfer and engineering chemistry, solid Mechanics, material processing, material Properties, measurements, and mechanical Design.
D7. Have the experimental and computational skills for a professional career as team member or leader in multidisciplinary engineering projects using organization tools,
D8: Be aware of the value of sustainable learning and environmental/social issues surrounding materials.

4. Learning Outcomes (LOs)

Cognitive Domain (Knowledge)	
1	Identify the nature and mechanisms of corrosion.
2	Explain why metals exhibit corrosion.
3	Distinguish between wet corrosion and high temperature oxidation.
Psychomotor Domain (Skills)	
4	Proceeds corrosion rate measurements.
5	Set protection systems.
Affective Domain (Attitudes)	
6	Participates in failure case studies.

5. Course LOs Mapping with Level of Competencies

LOs	**Level of Competences**					
	A1	**A2**	**A5**	**D3**	**D7**	**D8**
Cognitive Domain						
1	●			●		●
2	●	●	●		●	
3	●	●	●			●
Psychomotor Domain						
4		●	●		●	
5		●	●		●	
Affective Domain						
6					●	●

6. Assessment and Feedback Strategy

Summative Assessment Methods	Formative Assessment Methods
• Assignments (Solving problems/Case studies/In class discussion/ Related-To-Self Reading) • Lab Activities • Quizzes - Online + Written • Oral/Practical exam • Written exams (midterm & final term)	• In class discussion

7. Teaching and Learning Methods

- Interactive Lectures; [Microsoft Teams platform]
- Tutorials; [Mix of Microsoft Teams platform & on campus]
- Practical lab activities; [on campus]

8. List of References

a. Course notes

- Developed by course instructors uploaded to LMS and Microsoft Teams

b. Essential books (textbooks)

- Mars G. Fontana, Corrosion Engineering, 3rd ed., McGraw-Hill, ISBN 978-0070214637, 1985.
- Pedeferri Pietro, Corrosion Science and Engineering, Springer Nature Switzerland AG, ISBN 978-3-319-97625-9, 2018. (https://link.springer.com/book/10.1007/978-3-319-97625-9)

c. Web sites

- https://www.corrosion-doctors.org/
- https://www.nace.org/home
- https://www.journals.elsevier.com/corrosion-science

9. Study Plan

Week	Course Content	Lecture Hours	Tut. /lab Hours
1&2	Introduction: importance of studying corrosion, corrosion thermodynamic, corrosion kinetics.	**6**	**2**
3	Corrosion cells	**3**	**1**
4&5	Corrosion types: general atmospheric corrosion, corrosion by soil, corrosion by water and steam, localized corrosion, stress corrosion,	**6**	**2**

6&7	Factors affecting corrosion: metallurgical related factors, environmental related factors.	**6**	**2**
8	Mid Term	**3**	**-**
9	High temperature oxidation.	**3**	**1**
10	Alloy behavior at high temperature.	**3**	**1**
11	Corrosion testing, monitoring and corrosion rate measurement.	**3**	**1**
12	Corrosion protection: design aspects, environmental control, material selection for corrosive environments.	**3**	**1**
13	Corrosion protection: fundamental of inhibitors	**3**	**1**
14	Cathodic and anodic protection	**3**	**1**
15	Analysis of corrosion failure.	**3**	**2**
Total Number of Hours		**45**	**15**

Tutorial/lab Activates (assignments, reports, and discussions)

Week	Title	Tut. /lab Hours
1	Corrosion thermodynamics	**1**
2	Cell potential calculation	**2**
3	Corrosion rate measurement technology	**1**
4	Corrosion rate calculation and corrosion kinetics	**2**
5	Corrosion Polarization	**3**
6	Corrosion testing	**2**
7	Corrosion monitoring systems	**1**
8	Corrosion failure analysis	**1**
9	Student activity: corrosion case study (in the surrounding environment)	**2**
Total		**15**

10. Course Content / LOs Matrix

Topic	Course Content	1	2	3	4	5	6
1	Introduction: importance of studying corrosion, corrosion thermodynamic, corrosion kinetics.	●	●	●			
2	Corrosion cells	●					
3	Corrosion types: general atmospheric corrosion, corrosion by soil, corrosion by water and steam, localized corrosion, stress corrosion,	●		●			
4	Factors affecting corrosion: metallurgical related factors, environmental related factors.	●	●				
5	High temperature oxidation.	●		●			
6	Alloy behavior at high temperature.		●				
7	Corrosion testing, monitoring and corrosion rate measurement.	●		●	●		
8	Corrosion protection: design aspects, environmental control, material selection for corrosive environments					●	
9	Corrosion protection: fundamental of inhibitors					●	

10	Cathodic and anodic protection					●	
11	Analysis of corrosion failure.	●	●	●	●		●

11. Assessment & Feedback Strategies / LOs Matrix

Assessment Methods	1	2	3	4	5	6
Assignments (Solving problems/case study/In class …...	●	●	●	●	●	
Student Activities (Report and Case study)	●	●	●	●	●	●
Quizzes (2-4)	●	●	●			
Oral-Practical Exam	●	●	●	●	●	●
Written exams (Mid-Term & Final)	●	●	●			

12. Teaching & Learning Methods / LOs Matrix

Learning Methods	1	2	3	4	5	6
Lectures	●	●	●		●	
Tutorial	●	●	●	●		
Lab				●	●	●
Presentation/case study & In class discussion			●			●
Student self-assessment case study						●

Course Specification

1. Basic Information

MDP489	Selected Topics in Metal Forming		3 CH
Prerequisites			
Number of weekly Contact Hours			
Lecture	Tutorial	Laboratory	
2	1	2	
Required SWL	125	Equivalent ECTS	5
Course Content			
Selected topics in recent directions and advanced forming techniques. High energy rate forming, electro- hydraulic, electromagnetic, Dynapak, Petro Forge.			
Used in Program / Level			
Program Name or requirement		Study Level	
Design and Production Engineering Program Concentration		3	
Assessment Criteria			
Student Activities	Mid-Term Exam	Practical Exam	Final Exam
60%	0%	0%	40%
Exam Duration [Hours]	1		3
Equivalent to other course in another university			
University	N/A		
Course code and title	N/A		

2. Course Aims

By the end of the course the students will be able to:

- Understand the difference between newly developed metal forming processes.
- Represent the theoretical analysis of some metal forming processes.
- Recognize process defects and their remedies to obtain product with high quality.
- Formulate load and power required for deformation and identify data needed to solve them.
- Identify the parameters affect each process.
- Perform some mechanical measurements

3. Program Competencies Served by Course.

A: Faculty Requirements

A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.

A2. Develop and conduct appropriate experimentation and/or simulation, analyse and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.

A5. Practice research techniques and methods of investigation as an inherent part of learning.

C: Program Competences

C1. Implement basic theories to production processes including new technologies in manufacturing to select proper processes and process parameters for specific products.

4. Learning Outcomes - LOs

Cognitive Domain	
1	Identify advanced metal forming processes and their applications.
2	Analyze load and power data and parameters affecting metal forming processes.
Psychomotor Domain	
3	Perform Finite element analysis in some metal forming processes.
Affective Domain	
4	Be aware of each metal forming process defects and alternative solutions to overcome them.

5. Course LOs Mapping with Level of Competencies

ILOs	Level of Competences			
	A1	A2	A5	C1
Cognitive Domain				
1	✓		✓	
2	✓			✓
Psychomotor Domain				
3		✓	✓	
Affective Domain				
4	✓			

6. Assessment and Feedback Strategy

- Assignments 15%
- Lab reports 10%
- Quizzes/project 25%
- Final 40%

7. Teaching and Learning Methods

- Interactive Lectures
- Face to face Lab.
- Online tutorials

8. List of References

a. Essential books (text books)

1- Bertram, Elasticity and Plasticity of Large Deformations, Fourth Edition, Springer, 2021.
2-Chaaban M.A., "An Introduction to Metal Forming", Central Agency for University, 1976

b. Recommended books

1-Tomasz Trzepieciński,"Recent Developments and Trends in Sheet Metal Forming", Metals - Open Access Metallurgy Journal 10(6):779, June 2020,
2- Z. R. Wang, W. Hu , S. J. Yuan , X. Wang "Engineering Plasticity: Theory And Application To Metal Forming Processes", Higher Education Press, Wiley, 2021
3. D. Banabic, H.-J. Bunge, K. Pohlandt, A.E. Tekkaya, "Formability of Metallic Materials ", Springer-Verlag Berlin Heidelberg New York in 2000
4. Rowe, G.W., "An Introduction to the Principles of Metalworking". Edward Arnold, London, 1965.

9. Study Plan

No	Course Content	Lecture (hours)	Tutorial (hours)	Lab (hours)
1	Introduction, High energy rate forming, High speed forming.	2	1	4
2	Explosive forming, process parameters, advantage, applications and equipment	4	2	2
3	Hydrofluid forming, process parameters, advantage, applications and equipment	4	2	2
4	Petro froming, process parameters, advantage, applications and equipment	2	1	2
5	Dynapak forming, process parameters, advantage, applications and equipment	2	1	2
6	Ectro discharge forming, process parameters, advantage, applications and equipment	2	1	4
7	Newly developed metal forming processes	2	1	4
8	Upper Bound analysis	2	1	2
9	Viscoelasticity analysis	2	1	2
10	Deep drawing analysis	2	1	4
10	Slip line field solution	2	1	2
11	Finite element analysis in metal forming	4	2	--

Total Number of Hours	30	15	30

No.	Title of Experiment	Laboratory Hours
1	Explosive forming.	2
2	Hydrofluid forming.	2
3	Petro forming.	2
4	Dynapak forming.	2
5	Electro discharge forming.	4
6	Viscoelasticity experiment	2
7	Drawablility	4
8	Forgeability experiment	4
9	Super plasticity	4
10	Net shape forming	4
Total Number of Hours		30

10. Course Content / LOs Matrix

No	Course Content	1	2	3	4
1	Introduction, High energy rate forming, High speed forming.	✓			✓
2	Explosive forming, process parameters, advantage, applications and equipment	✓			
3	Hydrofluid forming, process parameters, advantage, applications and equipment	✓	✓		✓
4	Petro froming, process parameters, advantage, applications and equipment	✓	✓		✓
5	Dynapak forming, process parameters, advantage, applications and equipment	✓	✓		✓
6	Ectro discharge forming, process parameters, advantage, applications and equipment	✓	✓		✓
7	Newly developed metal forming processes	✓	✓	✓	✓
8	Upper Bound analysis		✓		✓
9	Viscoelasticity analysis		✓	✓	✓
10	Deep drawing analysis		✓	✓	✓
11	Slip line field solution		✓		✓
12	Finite element analysis in metal forming	✓	✓	✓	✓

11. Assessment and Feedback Strategies / LOs Matrix

Assessment	1	2	3	4
Assignments	✓	✓	✓	✓
Lab reports	✓	✓	✓	
Quizzes	✓	✓		✓
Final Exam	✓	✓		✓

12. Teaching & Learning Methods / LOs Matrix

Learning Method	1	2	3	4
Lectures	✓	✓	✓	✓
Tutorials	✓	✓		✓
Labs	✓	✓	✓	✓