

The Bylaws of Undergraduate Programs

Faculty of Engineering, Ain Shams University



September 2018b

Version 190921

Program #1: Design and Production Engineering Program

Program Description

The Design and Production Engineering program prepares students for entry level professional practice in mechanical design and production engineering, both locally and internationally.

The Design and Production Engineering program is one of the oldest engineering programs in Egyptian universities. The program flourished with the boom in Egyptian industry during the sixties of the twentieth century. Recently, there is an increasing need for the modernization of industry in Egypt to cope with the global challenges of designing and producing cost effective products that can compete with the international market. Consequently, the Design and Production Engineering program needs to be modernized as well. The program developed at Ain Shams University equip students with necessary competencies contemporary to the current industry. It also inspires graduates for self-learning to cope with the requirements of ever-changing career path after their graduation.

Career Prospects

Design and Production Engineering is one of the most recognized disciplines in Egyptian industry. Design and Production engineers are needed in many industries aiming to design and produce all kinds of products, machines and equipment. Graduates work in all industrial sectors including engineering, metallurgical, petrochemical, textiles, furniture, etc. They can work as engineers in research and development, operations management, quality control, tool design, work study, cost analysis, process control, heat treatment, etc.

Graduates can be specialized in a specific field of the following concentrations: Manufacturing engineering, Mechanical design, Industrial engineering and operations management, or Materials engineering.

Program Concentrations

The program qualifies graduates to work as Design and Production engineers. The graduate can be specialized in one of the following four concentrations:

- 1. Mechanical Design
- 2. Industrial Engineering and Operations Management
- 3. Materials Engineering
- 4. Manufacturing Engineering

The program concentration is achieved by 12 credit hours including 6 credit hours of courses and 6 credit hours of the graduation project, all related to the specific concentration.

1. Mechanical Design: Graduates are more specialized in the design of mechanical systems. Graduates demonstrate additional abilities to model, analyse, and design mechanical components and systems using the most up-to-date tools of integrated systems.

2. Industrial Engineering and Operations Management: Graduates are more specialized in Industrial engineering and operations management. Graduates demonstrate additional abilities to analyse, design, integrate, operate, evaluate, control, automate, and implement methods and techniques to manage industrial systems.

3. Materials Engineering: Graduates are more specialized in materials engineering. Graduates demonstrate additional abilities to select, prepare, analyse, treat, and test materials for specific applications.

4. Manufacturing Engineering: Graduates are more specialized in manufacturing processes. Graduates demonstrate additional abilities to select and link different manufacturing processes to certain design requirement to achieve desired levels of quality, product and process performance.

Agreements with another University

The program is not yet partnered with another university.

Program Competences

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
- C3. Implement basics of industrial engineering to analyse, plan and design production systems.
- C4. Select materials suitable for specific application.
- C5. Demonstrate additional abilities related to the field of the concentration within Design and Production Engineering as listed below.

Concentration	Graduate attributes							
Mechanical design	C5a. Demonstrate additional abilities to model, analyse, and							
	design mechanical components and systems using the most up-							
	to-date tools of integrated systems.							
Industrial	C5b. Demonstrate additional abilities to analyse, design,							
Engineering	integrate, operate, evaluate, control, automate, and implement							
	methods and techniques to manage industrial systems.							
Materials	C5c. Demonstrate additional abilities to select, prepare, analyse,							
Engineering	treat, and test materials for specific applications.							
Manufacturing	C5d. Demonstrate additional abilities to select and link different							
	manufacturing processes to certain design requirement to							
	achieve desired levels of quality, product and process							
	performance.							

Required Courses

In order to get a Bachelor of Science Degree in this program, and to satisfy the Program Competences, the following set of courses need to be completed.

		Cred	its and	Contact Hours				
Code	Course little	СН	ECTS	SWL	Lec	Tut	Lab	TT
	Ain Shams University Requirements	14	17	425	12	6	0	18
	Faculty of Engineering Requirements	42	76	1900	34	23	14	71
	Mechanical Engineering Requirements	63	110	2750	48	33	23	104
MDP312	Mechanical System Design	3	6	150	2	2	2	6
MDP381	Theory of Metal Forming	3	5	125	2	2	1	5
MDP382	Theory of Metal Cutting	3	5	125	2	2	1	5
MDP383	Metal Forming Technology, Machines and Dies	3	5	125	2	2	1	5
MDP384	Metal Cutting Machines and Technology	3	6	150	2	2	2	6
MDP481	Design of Tools and Production Facilities	3	4	100	2	2	0	4
MDP482	Metrology and Measuring Instruments	4	8	200	3	0	5	8
MDP483	Computerized Numerical Control Machines	2	4	100	2	1	1	4
MD222	Work Study	2	6	150	2	2	0	1
MDD222	Operations Research	2	6	150	2	2	0	4
	Operations Management	2	6	150	2	2	0	4
		2 2	7	175	2	2	0	4
MDP432		2 2		175	2	2	0	4
IVIDP455		5	5	125	2	Ζ	0	4
	Design and Production Concentration Elective (1)	3	5	125	2	2	1	5
	Design and Production Concentration Elective (2)	3	5	125	2	2	1	5
MDP401	Design and Production Engineering Graduation Project (1)	3	7	175	1	0	6	7
MDP402	Design and Production Engineering Graduation Project (2)	3	7	175	1	0	6	7
	Program Requirements Total	170	300	7500	127	89	64	280
Pool of Mec	hanical Design Concertation Elective Courses							
MDP411	Introduction to Finite Elements	3	5	125	2	2	0	4
MDP412	Noise and Vibration Control	3	5	125	2	2	1	5
MDP413	Design Optimization	3	5	125	3	1	1	5
MDP414	Product Design and Development	3	5	125	2	2	2	6
MDP415	Selected Topics in Mechanical Design	3	5	125	2	2	1	5
Pool of Industrial Engineering Concertation Elective Courses								
MDP434	Quality Systems and Assurance	3	5	125	2	2	0	4
MDP435	Industrial Systems Modelling and Simulation	3	5	125	2	0	3	5
MDP436	Production Planning and Control	3	5	125	2	2	0	4
MDP437	Ergonomics	3	5	125	2	2	0	4
Pool of Mate	erials Engineering Concertation Elective Courses							
MDP256	Phase Transformation and Heat Treatment	3	5	125	2	2	2	6
MDP451	Failure Analysis	3	5	125	3	0	1	4
MDP452	Material, Processing and Desing	3	5	125	3	0	1	4
MDP453	Composites Technology	3	5	125	3	0	1	4
MDP454	Corrosion	3	5	125	3	0	1	4
MDP455	Renewable Materials	3	5	125	2	2	2	6
Pool of Manufacturing Concertation Elective Courses								
MDP484	Product Life Cycle Management	3	5	125	2	1	2	5
MDP485	Advanced Topics in CNC Machine Tools	3	5	125	2	2	1	5
MDP486	Selected Topics in Manufacturing	3	5	125	2	1	2	5
MDP487	Computer Integrated Manufacturing	3	5	125	2	2	1	5
MDP488	Advanced Manufacturing Technology	3	5	125	2	2	0	5
MDP489	Selected Topics in Metal Forming	3	5	125	2	1	2	4

Table 16 List of Design and Production Engineering Program Requirements courses.

Proposed Study Plan

Carla		Credits and SWL			Contact Hours				Pre-
Code	Course litle	СН	ECTS	SWL	Lec	Tut	Lab	TT	requisites
Semester 1									
PHM012	Mathematics (1)	3	5	125	3	2	0	5	Eng/Math
PHM021	Vibration and Waves	3	5	125	3	1	1	5	Eng/Math
PHM031	Statics	3	5	125	2	2	1	5	Eng/Math
MDP011	Engineering Drawing	3	6	150	1	3	2	6	
PHM041	Engineering Chemistry	3	5	125	2	1	2	5	Eng
CSE031	Computing in Engineering	2	4	100	2	0	0	2	
Total		17	30	750	13	9	6	28	
	Semester	2							
PHM013	Mathematics (2)	3	5	125	3	2	0	5	PHM012
PHM022	Electricity and Magnetism	3	5	125	3	1	1	5	Eng/Math
PHM032	Dynamics	3	5	125	2	2	1	5	PHM031
CEP011	Projection and Engineering Graphics	3	6	150	1	3	2	6	
MDP081	Production Engineering	3	5	125	2	0	3	5	Eng
ENG011	Fundamentals of Engineering	2	4	100	2	1	0	3	
	Total	17	30	750	13	9	7	29	
	Semester	3						-	
PHM111	Probability and Statistics	2	4	100	2	2	0	4	PHM013
MDP151	Structures and Properties of Materials	2	4	100	2	1	1	4	PHM041
MDP111	Mechanical Engineering Drawing	3	6	150	1	3	2	6	MDP011
MDP181	Manufacturing Technology (1)	3	5	125	3	0	2	5	MDP081
MEP111	Thermal Physics	2	4	100	1	2	0	3	
EPM116	Electrical Circuits and Machines	4	6	150	3	2	1	6	PHM022
	Total	16	29	725	12	10	6	28	
Semester 4						F			
PHM112	Differential Equations and Numerical Analysis	4	6	150	3	2	0	5	PHM013
PHM131	Rigid body dynamics	2	4	100	2	1	1	4	PHM032
MDP112	Machine Construction	3	5	125	2	2	0	4	MDP111
MDP152	Metallurgy and Material testing	3	5	125	3	1	1	5	MDP151
MEP211	Thermodynamics	4	6	150	3	2	1	6	MEP111
ECE215	Introduction to Electronics	2	4	100	2	1	1	4	PHM022
Total		18	30	750	15	9	4	28	
Semester 5									
MDP231	Engineering Economy	2	4	100	2	1	0	3	
MDP212	Mechanics of Machines	4	6	150	3	3	1	7	PHM131
MDP211	Machine Elements Design	4	8	200	3	2	2	7	MDP112
MEP221	Fluid Mechanics and Turbomachinery	4	7	175	3	2	1	6	PHM112
MEP231	Measurement and Instrumentation	2	5	125	1	0	3	4	
Total		16	30	750	12	8	7	27	

Cada	Course Title	Credits and SWL			Contact Hours			S	Pre-
Code	Course little		ECTS	SWL	Lec	Tut	Lab	TT	requisites
Semester 6									
MDP232	Industrial Project management	2	4	100	2	1	0	3	
MDP251	Casting and Welding (1)	3	4	100	2	2	1	5	MDP152
MDP311	Mechanical Vibrations	4	7	175	3	2	1	6	PHM131
MEP212	Heat Transfer	4	8	200	2	2	3	7	MEP211
	Mechanical Requirement Elective	2	4	100	2	1	1	4	
ASU112	Report Writing and Communication skills	3	4	100	2	2	0	4	
	Total	18	31	775	13	10	6	29	
	Semester	7			-	-			
MDP333	Operations Research	3	6	150	2	2	0	4	PHM013 PHM111
MCT211	Automatic Control	3	5	125	3	1	1	5	PHM112
	ASU Elective (1)	2	2	50	2	1	0	3	
MDP312	Mechanical System Design	3	6	150	2	2	2	6	MDP211
MDP383	Metal Forming Technology, Machines and Dies	3	5	125	2	2	1	5	MDP181
MDP384	Metal Cutting Machines and Technology	3	6	150	2	2	2	6	MDP181 MDP211
	Total	17	30	750	13	10	6	29	11101 211
	Semester	8		/30	10	10			
MDP381	Theory of Metal Forming	3	5	125	2	2	1	5	MDP181
MDP382	Theory of Metal Cutting	3	5	125	2	2	1	5	MDP181
MDP332	Work Study	3	6	150	2	2	0	4	PHM111
MCT311	Hydraulics and Pneumatics Control	3	5	125	3	1	1	5	MEP221
	Concentration Elective (1)	3	5	125	2	2	1	5	
ASU	ASU Elective (2)	2	2	50	2	0	0	2	
	Total	17	28	700	13	9	4	26	
Semester 9									
MDP483	Computerized Numerical Controlled Machines	2	4	100	2	1	1	4	MDP382
MDP482	Metrology and Measuring Instruments	4	8	200	3	0	5	8	
MDP431	Operations Management	3	6	150	2	2	0	4	MDP231
	Concentration Elective (2)	3	5	125	2	2	1	5	
MDP401	Design and Production Engineering Graduation Project (1)	3	7	175	1	0	6	7	Elec. (1)
ASU114	Selected Topics in Contemporary Issues	2	2	50	2	0	0	2	
	Total	17	32	800	12	5	13	30	
Semester 10									
ASU111	Human Rights	2	2	50	2	1	0	3	
MDP432	Facilities Planning	3	7	175	2	2	0	4	MDP332
MDP433	Quality Control	2	5	125	2	2	0	Δ	PHM111
MDP481	Design of Tools and Production Facilities	ך ר	4	100	2	2	0	Δ	MDP382
MDP402	Design and Production Engineering Graduation Project (2)	3	7	175	1	0	6	7	MDP401
ASU113	Professional Ethics and Legislations	ર	Δ	100	2	2	0	Δ	
Total		17	29	725	11	9	6	26	