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.

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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

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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.

Recommended books

5.3

   - William J. Stevenson, Production Operation Management, Mc Graw-Hill companies, Inc., Six Editions, 1999.

Periodicals, Web sites, … etc

5.4

   - 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.

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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		●						●	●	●	●	●							

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