

## Manufacturing Engineering Program

### Program Description

Nowadays there are rising needs to modernize manufacturing industry to cope with the global challenges of producing cost effective products, competing at international markets and adapting to rapidly changing technologies for modern industry. Manufacturing Engineering is a complex discipline that requires a great deal of diverse and specialized knowledge. Manufacturing engineers are required by companies involved in manufacturing any kind of products, ranging from machines, equipment and robotics to all consumer products. The Program provides a broad technical background for students, in addition to proficiency in engineering methods, problem-solving and decision-making skills to a variety of manufacturing engineering issues. The aim of the program is to graduate manufacturing engineers who will be responsible for the design, selection of materials, specifications and the improvement of production processes and equipment. Responsibility for design and enhance of manufacturing systems, production management and control, as well as plant maintenance are also required by manufacturing engineers.

### Career Prospects

Manufacturing Engineering Program Graduates may seek jobs at companies involved in manufacturing any kind of products, ranging from machines, equipment and robotics to all consumer products. They often have their choice of challenging positions such as manufacturing engineer, production manager, design engineer, quality specialist, process analyst, maintenance engineer, operations manager, continuous improvement engineer, or technical sales engineer.

### Program Concentrations

The Manufacturing Engineering Program offers two concentrations. Each concentration is offered through a pool of 6 courses, from which students should select 4 courses (12 Credit Hours), 2 from pool A and 2 from pool B, in addition to the graduation project (1) and (2) which represent additional 6 Credit Hours; i.e. the concentration will be 18 Credit Hours. Two additional elective courses, one from each pool, are offered that students choose from the other concentration. The offered concentrations are as follows:

- 1. Advanced Manufacturing Systems:** in this concentration the modern techniques used in manufacturing process, automation and some special topics related to the manufacturing processes will be covered.
- 2. Manufacturing Management:** All topics related to how to manage the manufacturing systems, evaluate its performance and/or propose improvement enhancing its competitiveness are covered by this concentration.

### Agreements with another University

The program is in partnership with the University of East London (UEL), United Kingdom for a Bachelor Dual Degree. Students joining this agreement will pay an additional fee, to substitute expenses for the external Quality Audits/Moderation Boards that will take place in Egypt. The Graduates should receive two B.Sc. certificates, one from the University of East London, and one from Ain Shams University. Students are allowed to study a full year or more in London with a 10% reduction in the UK tuition fees.

**Program Competences**

In addition to the competences for all Engineering Programs (A-Level), the Manufacturing Engineering Program graduate must be able to (D-Level):

- 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.
- D2. Model and analyse physical systems applicable to the specific discipline by applying the concepts of: Material Properties, solid Mechanics, Material Processing, Measurements, and Mechanical Design.
- D3. Design mechanical systems and machine elements using appropriate materials both traditional means and computer-aided tools and software contemporary to the mechanical engineering field.
- D4. Understand, select and plan various materials processing technologies to produce different types of products.
- D5. Design products, process and the equipment, tooling and environment necessary for their manufacture to meet desired needs within realistic constraints.
- D6. Apply knowledge, problem solving techniques, and hands-on skills in assessment of design, operation and continuous improvement of manufacturing systems, including automated manufacturing processes, process controls, manufacturing operations management, and systems integration.
- D7. Understanding of the creation of competitive advantage through manufacturing planning, strategy, and control.
- D8. Adopt suitable national and international standards and codes to: design, build, operate, inspect and maintain industrial equipment and systems.
- D9. For each concentration the following competences are achieved:

<b>Concentration</b>	<b>Graduate attributes</b>
Advanced Manufacturing systems	9a. Understand automated manufacturing processes and their impact on the manufacturing system. 10a. Outline basic ideas of industrial automation in modern manufacturing including Programmable Logic Controllers (PLC), Robotics, and CIM. 11a. Apply advanced methods to the analysis, synthesis and control of automated systems.
Manufacturing Management	9b. Understand the analysis, synthesis, and control of manufacturing operations using statistical and calculus-based methods, simulation and information technology. 10b. Create competitive advantage through manufacturing planning, strategy, quality and control. 11b. Improve cost, quality, time, and flexibility goals using world class management methodologies.

## 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.

Table 28 List of Manufacturing Engineering Program Requirements courses.

Code	Course Title	Credits and SWL			Contact Hours			
		CH	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
PHM131	Rigid body dynamics	2	4	100	2	2	0	4
PHM112	Differential Equations and Numerical Analysis	4	6	150	3	2	0	5
MEP111	Thermal Physics	2	4	100	1	2	0	3
MEP211	Thermodynamics	4	6	150	3	2	1	6
MEP221	Fluid Mechanics and Turbomachinery	4	7	175	3	2	1	6
MEP231	Measurements and Instrumentation	2	5	125	1	0	3	4
MDP111	Mechanical Engineering Drawing	3	6	150	1	3	2	6
MDP112	Machine Construction	3	5	125	2	2	0	4
MDP211	Machine Elements Design	4	8	200	3	2	2	7
MDP212	Mechanics of Machines	4	6	150	3	3	1	7
MDP414	Product Design and Development	3	5	125	2	2	2	6
MDP331	Maintenance planning and scheduling	2	4	100	2	1	0	3
MDP433	Quality Control	3	5	125	2	2	0	4
MDP152	Metallurgy and Material Testing	3	5	125	3	1	1	5
MDP251	Casting and Welding (1)	3	4	100	2	2	1	5
MDP252	Casting and Welding (2)	2	4	100	2	0	2	4
MDP351	Industrial Furnaces and Heat Treatment	2	4	100	2	1	0	3
MDP462	Polymer Processing Techniques	2	4	100	2	0	2	4
MDP182	Metal Forming Theory and Processes	3	7	175	2	1	3	6
MDP281	Metal Cutting Theory and Technologies	4	8	200	3	1	3	7
MDP282	Non-Conventional Processing	2	4	100	2	0	2	4
MDP385	Manufacturing Processes	2	4	100	2	1	1	4
MDP386	Computer Aided Manufacturing	3	6	150	2	0	3	5
MDP387	Metrology	3	5	125	2	0	3	5
MDP490	Die Design	3	6	150	2	3	0	5
MDP233	Work Study and Plant Layout	4	6	150	3	2	0	5
MDP334	Principles of Operation Management	3	5	125	2	2	0	4
MDP441	Industrial technologies	2	4	100	2	1	0	3
EPM116	Electrical Circuits and Machines	4	6	150	3	2	1	6
ECE215	Introduction to Electronics	2	4	100	2	1	1	4
MCT211	Automatic Control	3	5	125	3	1	1	5
	Manufacturing Program Concentration Elective (1) A	3	5	125	2	2	0	4
	Manufacturing Program Concentration Elective (2) A	3	5	125	2	2	0	4
	Manufacturing Program Concentration Elective (3) A	3	5	125	2	2	0	4
	Manufacturing Program Concentration Elective (4) B	3	6	150	2	2	0	4
	Manufacturing Program Concentration Elective (5) B	3	6	150	2	2	0	4
	Manufacturing Program Concentration Elective (6) B	3	6	150	2	2	0	4
MDP401	Design and Production Engineering Graduation Project (1)	3	6	150	1	0	6	7
MDP402	Design and Production Engineering Graduation Project (2)	3	6	150	1	0	6	7
<b>Total</b>		<b>170</b>	<b>300</b>	<b>7500</b>	<b>129</b>	<b>85</b>	<b>62</b>	<b>276</b>

Pool of Manufacturing Management Concentration Elective Courses								
Pool A								
MDP336	Facilities Layout and Design	3	5	125	2	2	0	4
MDP439	Lean Manufacturing System	3	5	125	2	2	0	4
MDP440	Quality Assurance and Six Sigma	3	5	125	2	2	0	4
Pool B								
MDP333	Operations Research	3	6	150	2	2	0	4
MDP335	Production Planning and Scheduling	3	6	150	2	2	1	5
MDP438	Simulation of Manufacturing Systems	3	6	150	2	0	3	5
Pool of Advanced Manufacturing Concentration Elective Courses								
Pool A								
MCT311	Hydraulics and Pneumatics Control	3	5	125	3	1	1	5
MCT313	Automation	3	5	125	3	1	1	5
MCT345	Industrial Mechanisms and Robotics	3	5	125	2	2	1	5
Pool B								
MCT414	Automation and Communication Systems for Manufacturing	3	6	150	2	2	1	5
MDP492	Advanced Manufacturing Systems	3	6	150	2	2	1	5
MDP493	Additive Manufacturing	3	6	150	2	2	0	4
MDP491	Design of Jigs and Fixtures	3	6	150	2	2	0	4

## Proposed Study Plan

Code	Course Title	Credits and SWL			Contact Hours				Pre-requisites
		CH	ECTS	SWL	Lec	Tut	Lab	TT	
<b>Semester 1</b>									
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	
<b>Semester 2</b>									
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	
<b>Semester 3</b>									
MDP151	Structures and properties of materials	2	4	100	2	1	1	4	PHM041
EPM116	Electrical Circuits and Machines	4	6	150	3	2	1	6	PHM022
PHM112	Differential Equations and Numerical Analysis	4	6	150	3	2	0	5	PHM013
PHM131	Rigid body dynamics	2	4	100	2	2	0	4	PHM032
MEP111	Thermal Physics	2	4	100	1	2	0	3	
MDP111	Mechanical Engineering Drawing	3	6	150	1	3	2	6	MDP011
Total		17	30	750	12	12	4	28	
<b>Semester 4</b>									
MDP182	Metal Forming Theory and Processes	3	7	175	2	1	3	6	MDP081 MDP151
MEP221	Fluid Mechanics and Turbomachinery	4	7	175	3	2	1	6	PHM112
MEP211	Thermodynamics	4	6	150	3	2	1	6	MEP111
MDP152	Metallurgy and Material Testing	3	5	125	3	1	1	5	MDP151
MDP212	Mechanics of Machines	4	6	150	3	3	1	7	PHM131
Total		18	31	775	14	9	7	30	
<b>Semester 5</b>									
ECE215	Introduction to Electronics	2	4	100	2	1	1	4	PHM022
PHM111	Probability and Statistics	2	4	100	2	2	0	4	PHM013
MDP231	Engineering Economy	2	4	100	2	1	0	3	
MDP281	Metal Cutting Theory and Technologies	4	8	200	3	1	3	7	MDP081
MDP251	Casting and Welding (1)	3	4	100	2	2	1	5	MDP152
MDP112	Machine Construction	3	5	125	2	2	0	4	MDP111
Total		16	29	725	13	9	5	27	

Code	Course Title	Credits and SWL			Contact Hours				Pre-requisites
		CH	ECTS	SWL	Lec	Tut	Lab	TT	
<b>Semester 6</b>									
MEP231	Measurements and Instrumentation	2	5	125	1	0	3	4	
ASU112	Report Writing and Communication skills	3	4	100	2	2	0	4	
MDP252	Casting and Welding (2)	2	4	100	2	0	2	4	MDP251
MDP211	Machine Elements Design	4	8	200	3	2	2	7	MDP112
MCT211	Automatic Control	3	5	125	3	1	1	5	PHM112
MDP282	Non-Conventional Processing	2	4	100	2	0	2	4	MDP281 PHM041
Total		16	30	750	13	5	10	28	
<b>Semester 7</b>									
	ASU Elective (1)	2	3	75	2	1	0	3	
MDP232	Industrial Project management	2	4	100	2	1	0	3	
MDP351	Industrial Furnaces and Heat Treatment	2	4	100	2	1	0	3	MDP152
	Manuf. Program Concentration Elective (1) A	3	5	125	2	2	0	4	
MDP387	Metrology	3	5	125	2	0	3	5	MDP281
MDP233	Work Study and Plant Layout	4	6	150	3	2	0	5	PHM111
MDP462	Polymer Processing Techniques	2	4	100	2	0	2	4	
Total		18	31	775	15	7	5	27	
<b>Semester 8</b>									
	ASU Elective (2)	2	2	50	2	1	0	3	
MDP334	Principles of Operation Management	3	5	125	2	2	0	4	MDP231
MDP331	Maintenance planning and scheduling	2	4	100	2	1	0	3	
MDP386	Computer Aided Manufacturing	3	6	150	2	0	3	5	MDP281
MDP441	Industrial technologies	2	4	100	2	1	0	3	MDP233
MDP385	Manufacturing Processes	2	4	100	2	1	1	4	MDP182 MDP281
	Manuf. Program Concentration Elective (2) A	3	5	125	2	2	0	4	
Total		17	30	750	14	8	4	26	
<b>Semester 9</b>									
ASU114	Selected Topics in Contemporary Issues	2	2	50	2	0	0	2	
	Manuf. Program Concentration Elective (3) A	3	6	150	2	2	0	4	
MDP401	Design and Production Engineering Graduation Project (1)	3	6	150	1	0	6	7	
	Manuf. Program Concentration Elective (4) B	3	5	125	2	2	0	4	
MDP490	Die Design	3	6	150	2	3	0	5	MDP385 MDP211
MDP414	Product Design and Development	3	5	125	2	2	2	6	
Total		17	30	750	11	9	8	28	
<b>Semester 10</b>									
ASU111	Human Rights	2	2	50	2	1	0	3	
ASU113	Professional Ethics and Legislations	3	4	100	2	2	0	4	
MDP402	Design and Production Engineering Graduation Project (2)	3	6	150	1	0	6	7	MDP401
	Manuf. Program Concentration Elective (5) B	3	6	150	2	2	0	4	
	Manuf. Program Concentration Elective (6) B	3	6	150	2	2	0	4	
MDP433	Quality Control	3	5	125	2	2	0	4	PHM111
Total		17	29	725	11	9	6	26	

# Manufacturing Engineering Program Course Tree

