



Elective Course (1)

Course Specification of Manufacturing Systems Engineering

I. Course Identification and General Information:						
1	Course Title:	Manufacturing Systems Engineering.				
2	Course Code & Number:	MT310.				
3	Credit hours:	C.H				TOTAL CR. HRS.
		Th.	Seminar	Pr.	Tu.	
		2	-	-	2	
4	Study level/ semester at which this course is offered:	Fourth Year-Second Semester.				
5	Pre –requisite (if any):	Manufacturing Process.				
6	Co –requisite (if any):	None.				
7	Program (s) in which the course is offered:	Mechatronics Engineering Program.				
8	Language of teaching the course:	English Language.				
9	Location of teaching the course:	Mechatronics Engineering Department.				
10	Prepared By:	Ass. Prof. Dr. Amin Al-Khulaidi				
11	Date of Approval:					

II. Course Description:
<p>This course surveys the design and management of manufacturing systems, and also offers the opportunity to understand the relationship between materials flow and information flow. It includes topics such as plant layout, planning, scheduling and control of manufacturing systems with emphasis on information flow and decision-making. Contemporary manufacturing topics are emphasized.</p>

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III. Course Intended learning outcomes (CILOs) of the course		Referenced PILOs
a.1	Recognize the fundamentals of manufacturing systems concept.	A2
a.2	Identify the different modes of production.	
b.1	Analyze manufacturing systems through the application of mathematical models.	B1
b.2	Investigate the suitable product, process planning and design for given products.	
c.1	Implement manufacturing systems components.	C2
c.2	Demonstrate methods and tools used in manufacturing systems	
d.1	Cooperate as a part of a team in discussion group for a real case study.	D1
d.2	Evaluate manufacturing systems case study and required reporting.	D6

(A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
a1- Recognize the fundamentals of manufacturing systems concept.	<ul style="list-style-type: none"> • Lectures, • Tutorials, 	<ul style="list-style-type: none"> • Homework, • Quizzes, • Written Exams.
a2- Identify the different modes of production.		

(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
b1- Analyze manufacturing systems through the application of mathematical models.	<ul style="list-style-type: none"> • Lectures, • Tutorials, 	<ul style="list-style-type: none"> • Homework, • Quizzes, • Written Exams.
b2- Investigate the suitable product, process planning and design for given products.		

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© Alignment Course Intended Learning Outcomes of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
c1- Implement manufacturing systems components.	<ul style="list-style-type: none"> Lectures, Tutorials, 	<ul style="list-style-type: none"> Homework, Quizzes, Written Exams.
c2- Demonstrate methods and tools used in manufacturing systems		

(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:		
Course Intended Learning Outcomes	Teaching strategies	Assessment Strategies
d1- Cooperate as a part of a team in discussion group for a real case study.	<ul style="list-style-type: none"> Lectures, 	<ul style="list-style-type: none"> Quizzes, Written Exams.
d2- Evaluate manufacturing systems case study and required reporting.		

IV. Course Content:					
A – Theoretical Aspect:					
Order	Units/Topics List	Learning Outcomes	Sub Topics List	Number of Weeks	Contact hours
1.	Fundamentals of Manufacturing Systems.	a1,b1,c1	<ul style="list-style-type: none"> Fundamentals of Manufacturing Fundamentals of Manufacturing Systems modes. Productivity Measurement 	1	2
2.	Modes of Production.	a1,a2,b2,c1,d1	<ul style="list-style-type: none"> Classification of Industry and Different Between Service and Manufacturing Industry. Types of production and their features. 	1	2

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			- Multi-product, small-batch production.		
3.	Plant Layout Planning and Design.	a1,a2,b1, b2,c1,c2, d1,d2	- Scope and problems of layout planning for Different Production Modes. - Systematic layout planning (Assembly line design, Job Shop Layout Design, Cellular Design) - Mathematical layout design - Production flow analysis - Materials Handling System Design and Analysis	3	6
4.	Process Planning and Design.	A1,a2,b2 ,c1,c2,d2	- The required machines/ equipment for new product. - Scope and problems of process planning - Process design for a real case - Optimum routing analysis - Assembly Line balancing process Design.	2	4
5.	Mid- Term Exam.	a1, a2, b1, b2, c1, c2	- The first 4 chapters.	1	2
6.	Production Planning and Control.	a1,a2,,b2 ,c1,c2,d2	- Product planning, the Steps/sequence required for new products. - Product design and its manufacturing sequence - Scope and problems of production control - Process control - Inventory control	2	4

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7.	Production Scheduling.	a1,a2,b1, c1,c2,d1, d2	- Scope of production scheduling - Process scheduling Sequencing and Dispatching. - EBQ	2	4
8.	Logistics Planning.	a1,a2 b1, c1,c2,d1	- Introduction to Supply Chain Management - Transportation problems Distribution Problems	1	2
9.	Engineering Cost Analysis.	a1, b1, c2,d1	- Types of production cost - Break-even point analysis - Wages and incentives - Depreciation	1	
10.	Review.	a1,a2,b1, b2,c1,c2, d1,d2	- All the chapters.	1	2
11.	Final Exam.	a1, a2, b1, b2, c1, c2	- All the chapters.	1	2
Number of Weeks /and Units Per Semester				16	32

B – Tutorial Aspect:

Order	Tasks/ Experiments	Number of Weeks	Contact hours	Learning Outcomes
1	Fundamentals of Manufacturing Systems.	1	2	a1,b1,c1
2	Modes of Production.	1	2	a1,a2,b2,c1,d1
3	Plant Layout Planning and Design.	3	6	a1,a2,b1,b2,c1,c2,d1,d2
4	Process Planning and Design.	2	4	A1,a2,b2,c1,c2,d2
5	Production Planning and Control.	2	4	a1,a2,,b2,c1,c2,d2
6	Production Scheduling.	2	4	a1,a2,b1, c1,c2,d1,d2

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7	Logistics Planning.	1	2	a1,a2 b1, c1,c2,d1
8	Engineering Cost Analysis.	1	2	a1, b1, c2,d1
9	Review.	1	2	a1,a2,b1,b2,c1,c2,d1,d2
Number of Weeks /and Units Per Semester		14	28	

V. Teaching strategies of the course:

- Lectures.
- Group Discussion.
- Tutorials.

VI. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1.	- Problems of suitable plant layout design - Plant layout flow analysis - Assignment modeling for selective cases in plant layout	a1,a2,b1,b2,c1,c2,d1,d2	3	2.5
2.	- Assembly Line balancing Design.	a1,a2,b2,c1,c2,d2	6	2.5
3.	- Process scheduling Sequencing and Dispatching. - EBQ - Inventory control	a1,a2,b1, c1,c2,d1,d2	8	2.5
4.	- Transportation problems - Break-even point analysis - Wages and incentives - Deprecation	a1,a2 b1, c1,c2,d1	10	2.5
Total				10

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VII. Schedule of Assessment Tasks for Students During the Semester:					
No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1.	Assignment.	1-14	15	10%	a1,a2,b1,b2,c1,c2,d1,d2
2.	Mid-Term Exam.	8	30	20%	a1,a2,b1,b2,c1,c2,d1,d2
3.	Final Exam (theoretical).	16	105	70%	a1,a2,b1,b2,c1,c2,d1,d2
Total			150	100%	

VIII. Learning Resources:	
<ul style="list-style-type: none"> Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher). 	
1- Required Textbook(s) (maximum two).	
	<ol style="list-style-type: none"> R. Shanker (2004), Industrial Engineering and Management, 1st Edition, Galgotia Publications pvt. Ltd., New Delhi, India Katsundo Hitomi: (1996) “Manufacturing Systems Engineering, 2nd Edition, Taylor&Francis ISBN978-0-7484-0324-0
2- Essential References.	
	<ol style="list-style-type: none"> George Chrissolouris (2006) “Manufacturing Systems Theory and Practice (2nd Ed.)” Springer ISBN978-0-387-25683-2 Katsundo Hitomi: (2008) “Introduction to Manufacturing Systems Engineering (5th Ed.)” (Kyoritsu Publishing, ISBN978-4-320-08172-7, in Japanese
3- Electronic Materials and Web Sites etc.	
	<ol style="list-style-type: none"> Arena Simulation Software (assembly line balancing, flow analysis,...) CRAFT Plant-Layout Software Production Planning and Control Software

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IX. Course Policies:	
1	<p>Class Attendance:</p> <p>- A student should attend not less than 75 % of total hours of the subject; otherwise he will not be able to take the exam and will be considered as exam failure. If the student is absent due to illness, he/she should bring a proof statement from university Clinic.</p>
2	<p>Tardy:</p> <p>- For late in attending the class, the student will be initially notified. If he repeated lateness in attending class he will be considered as absent.</p>
3	<p>Exam Attendance/Punctuality:</p> <p>- A student should attend the exam on time. He is Permitted to attend an exam half one hour from exam beginning, after that he/she will not be permitted to take the exam and he/she will be considered as absent in exam.</p>
4	<p>Assignments & Projects:</p> <p>- The assignment is given to the students after each chapter; the student has to submit all the assignments for checking on time.</p>
5	<p>Cheating:</p> <p>- For cheating in exam, a student will be considered as fail. In case the cheating is repeated three times during his/her study the student will be disengaged from the Faculty.</p>
6	<p>Plagiarism:</p>

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	<p>Plagiarism is the attending of a student the exam of a course instead of another student. If the examination committee proofed a plagiarism of a student, he will be disengaged from the Faculty. The final disengagement of the student from the Faculty should be confirmed from the Student Council Affair of the university</p>
7	<p>Other policies:</p> <ul style="list-style-type: none"> - Mobile phones are not allowed to use during a class lecture. It must be closed, otherwise the student will be asked to leave the lecture room - Mobile phones are not allowed in class during the examination. <p>Lecture notes and assignments my given directly to students using soft or hard copy</p>

Reviewed By	<p>Vice Dean for Academic Affairs and Post Graduate Studies: Dr. Tarek A. Barakat President of Quality Assurance Unit: Ass. Prof. Dr. Mohammed Algorafi Head of Mechatronics Engineering Department: Ass. Prof. Dr. Abdul-Malik Momin</p>
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Elective Course (1)

Template for Course Plan of Manufacturing Systems Engineering

I. Information about Faculty Member Responsible for the Course:							
Name of Faculty Member	Ass. Prof. Dr. Amin Al-Khulaidi	Office Hours					
Location & Telephone No.		SAT	SUN	MON	TUE	WED	THU
E-mail		8-10					

II. Course Identification and General Information:						
1	Course Title:	Manufacturing Systems Engineering.				
2	Course Code & Number:	MT 310.				
3	Credit hours:	C.H				TOTAL Cr. Hrs.
		Th.	Seminar	Pr.	Tu.	
		2	-	-	2	
4	Study level/ semester at which this course is offered:	Fourth Year-Second Semester.				
5	Pre –requisite (if any):	Manufacturing Process.				
6	Co –requisite (if any):	None.				
7	Program (s) in which the course is offered:	Mechatronics Engineering Program				
8	Language of teaching the course:	English Language.				
9	System of Study:	Semesters.				
10	Mode of delivery:	Lectures and Tutorials.				
11	Location of teaching the course:	Mechatronics Engineering Department.				

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III. Course Description:

This course surveys the design and management of manufacturing systems, and also offers the opportunity to understand the relationship between materials flow and information flow. It includes topics such as plant layout, planning, scheduling and control of manufacturing systems with emphasis on information flow and decision-making. Contemporary manufacturing topics are emphasized.

IV. Course Intended learning outcomes (CILOs) of the course		Referenced PILOs
a.1	Recognize the fundamentals of manufacturing systems concept.	A2
a.2	Identify the different modes of production.	
b.1	Analyze manufacturing systems through the application of mathematical models.	B1
b.2	Investigate the suitable product, process planning and design for given products.	
c.1	Implement manufacturing systems components.	C2
c.2	Demonstrate methods and tools used in manufacturing systems	
d.1	Cooperate as a part of a team in discussion group for a real case study.	D1
d.2	Evaluate manufacturing systems case study and required reporting.	D6

V. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	Number of Weeks	Contact hours
1.	Fundamentals of Manufacturing Systems.	<ul style="list-style-type: none"> - Fundamentals of Manufacturing - Fundamentals of Manufacturing Systems modes. - Productivity Measurement 	1	2

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2.	Modes of Production.	<ul style="list-style-type: none"> - Classification of Industry and Different Between Service and Manufacturing Industry. - Types of production and their features. - Multi-product, small-batch production. 	2	2
3.	Plant Layout Planning and Design.	<ul style="list-style-type: none"> - Scope and problems of layout planning for Different Production Modes. - Systematic layout planning (Assembly line design, Job Shop Layout Design, Cellular Design) - Mathematical layout design - Production flow analysis - Materials Handling System Design and Analysis 	3,5	6
4.	Process Planning and Design.	<ul style="list-style-type: none"> - The required machines/ equipment for new product. - Scope and problems of process planning - Process design for a real case - Optimum routing analysis - Assembly Line balancing process Design. 	6-7	4
5.	Mid Term Exam.	<ul style="list-style-type: none"> - The first 4 chapters. 	8	2
6.	Production Planning and Control.	<ul style="list-style-type: none"> - Product planning, the Steps/sequence required for new products. - Product design and its manufacturing sequence - Scope and problems of production control - Process control - Inventory control 	9,10	4
7.	Production Scheduling.	<ul style="list-style-type: none"> - Scope of production scheduling - Process scheduling Sequencing and Dispatching. 	11,12	4

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		- EBQ		
8.	Logistics Planning.	- Introduction to Supply Chain Management - Transportation problems - Distribution Problems	13	2
9.	Engineering Cost Analysis.	- Types of production cost - Break-even point analysis - Wages and incentives - Deprecation	14	2
10.	Review.	- All the chapters.	15	2
11.	Final Exam.	- All the chapters.	16	2
Number of Weeks /and Units Per Semester			16	32

B – Tutorial Aspect:				
Order	Tasks/ Experiments	Number of Weeks	contact hours	Learning Outcomes
1	Fundamentals of Manufacturing Systems.	1	2	a1,b1,c1
2	Modes of Production.	2	2	a1,a2,b2,c1,d1
3	Plant Layout Planning and Design.	3,4,5	6	a1,a2,b1,b2,c1,c2,d1,d2
4	Process Planning and Design.	6,7	4	A1,a2,b2,c1,c2,d2
5	Production Planning and Control.	8,9	4	a1,a2,,b2,c1,c2,d2
6	Production Scheduling.	10,11	4	a1,a2,b1, c1,c2,d1,d2
7	Logistics Planning.	12	2	a1,a2 b1, c1,c2,d1
8	Engineering Cost Analysis.	13	2	a1, b1, c2,d1
9	Review.	14	2	a1,a2,b1,b2,c1,c2,d1,d2
Number of Weeks /and Units Per Semester		14	28	

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- Lectures.
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VII. Assignments:

No	Assignments	Aligned CILOs(symbols)	Week Due	Mark
1.	- Problems of suitable plant layout design - Plant layout flow analysis - Assignment modeling for selective cases in plant layout	a1,a2,b1,b2,c1,c2,d1 ,d2	3	2.5
2.	- Assembly Line balancing Design.	a1,a2,b2,c1,c2,d2	6	2.5
3.	- Process scheduling Sequencing and Dispatching. - EBQ - Inventory control	a1,a2,b1, c1,c2,d1,d2	8	2.5
4.	- Transportation problems - Break-even point analysis - Wages and incentives - Deprecation	a1,a2 b1, c1,c2,d1	10	2.5
Total				10

VIII. Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1.	Assignment.	1-14	15	10%	a1,a2,b1,b2,c1,c2,d1,d2
2.	Mid-Term Exam.	8	30	20%	a1,a2,b1,b2,c1,c2,d1,d2
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IX. Learning Resources:	
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3- Electronic Materials and Web Sites etc.	
	<ol style="list-style-type: none"> Arena Simulation Software (assembly line balancing, flow analysis,...) CRAFT Plant-Layout Software Production Planning and Control Software

X. Course Policies:	
1	<p>Class Attendance:</p> <p>- A student should attend not less than 75 % of total hours of the subject; otherwise he will not be able to take the exam and will be considered as exam failure. If the student is absent due to illness, he/she should bring a proof statement from university Clinic.</p>
2	<p>Tardy:</p> <p>- For late in attending the class, the student will be initially notified. If he repeated lateness in attending class he will be considered as absent.</p>
3	<p>Exam Attendance/Punctuality:</p>

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