

## Course Specification of: Modern Manufacturing Systems

### Course Code (MTE551)

• General Information About the Course:					
25.	Course Title:	<b>Modern Manufacturing Systems</b>			
26.	Course Code and Number:	3			
27.	Credit Hours:	Credit Hours			Total
		Lecture	Practical	Seminar/Tutorial	
		3			3
28.	Study Level and Semester:	1 <sup>st</sup> Semester			
29.	Pre-requisites (if any):	None			
30.	Co-requisites (if any):	None			
31.	Program (s) in which the course is offered:	MSc. In Mechatronics Engineering Program			
32.	Language of teaching the course:	English			
33.	Study System:	Courses & Thesis			
34.	Prepared By:	Dr Abdullah Dhaiban			
35.	Reviewed by:	Dr. ....			
36.	Date of Approval:				

### • Course Description:

Manufacturing systems engineering is concerned with the design and on-going operation and enhancement of the integrated elements within a manufacturing system, which is a very complex activity, even for simple products. The aim of this course is to develop students' understanding of that complexity within a modern manufacturing environment. This course covers elements that make up a manufacturing system, including production engineering, plant and maintenance engineering, product design, logistics, production planning and control, forecast quality assurance, accounting and purchasing, all of which work together within the manufacturing system to create products that meet customers' requirements.

### • Course Intended Learning Outcomes (CILOs):

Upon successful completion of **Modern Manufacturing Systems Course**, the graduates will be able to:

- a1 Identify the principles of manufacturing systems engineering.
- a2 - Identify the common production planning approaches and state their impact on manufacturing systems
- b1 - Apply a range of analysis techniques to determine the effectiveness and efficiency of a manufacturing system.
- b2- Analyze the impact of different production planning approaches on the

effectiveness of a manufacturing system.

c1- Develop an appropriate future state for a manufacturing system.

c2- Evaluate the effectiveness of production planning methods.

d1- Conduct independently research that advances and extends knowledge in Manufacturing Systems fields.

d2- Engage in independent lifelong learning.

**• Alignment of Course Intended Learning Outcomes (CILOs) to Program Intended Learning Outcomes (PILOs )**

CILOs		PILOs
<b>i. Knowledge and Understanding:</b> Upon successful completion of the <b>Modern Manufacturing Systems Course</b> , the graduates will be able to:		<b>I. Knowledge and Understanding:</b> Upon successful completion of the <b>MSc. In Mechatronics Engineering Program</b> , the graduates will be able to:
a1.	Identify the principles of manufacturing systems engineering.	A2. Recognize and explain the contemporary engineering technologies and issues in the field of Mechatronics engineering.
a2.	Identify the common production planning approaches and state their impact on manufacturing systems	A3. Explain in-depth the principles of sustainable design and development of Mechatronics engineering.
<b>j. Cognitive/ Intellectual Skills:</b> Upon successful completion of the <b>Modern Manufacturing Systems Course</b> , the graduates will be able to:		<b>J. Cognitive/ Intellectual Skills:</b> Upon successful completion of the <b>MSc. In Mechatronics Engineering Program</b> , the graduates will be able to:
b1.	Apply a range of analysis techniques to determine the effectiveness and efficiency of a manufacturing system.	B1. Apply appropriate principles, methodologies, techniques, tools and packages in the analysis, development and evaluation of mechatronics engineering systems.
b2.	Analyze the impact of different production planning approaches on the effectiveness of a manufacturing system.	B2. Identify, formulate and analyze research and solve complex Mechatronics engineering problems.
<b>k. Professional and Practical Skills:</b> Upon successful completion of the <b>Modern</b>		<b>K. Professional and Practical Skills:</b> Upon successful completion of the <b>MSc. In</b>

<b>Manufacturing Systems Course, the graduates will be able to:</b>		<b>Mechatronics Engineering Program, the graduates will be able to:</b>	
c1.	Develop an appropriate future state for a manufacturing system.	c1.	Conduct research to solve mechatronics engineering problems.
c2.	Evaluate the effectiveness of production planning methods.	c2.	Use advanced methodologies and skills to solve Mechatronics engineering problems.
<b>I. Transferable Skills:</b> Upon successful completion of the <b>Modern Manufacturing Systems Course</b> , the graduates will be able to:		<b>L. Transferable Skills:</b> Upon successful completion of the <b>MSc. In Mechatronics Engineering Program</b> , the graduates will be able to:	
d1.	Conduct independently research that advances and extends knowledge in Manufacturing Systems fields.	D1.	Prepare a complete thesis and term-courses works/ tasks, write their documents and defend on them.
d2.	Engage in independent lifelong learning.	D4.	Independent learning ability, self-direction and independence leading to the ability to continue to develop their knowledge understanding and skills through further professional development

## • Alignment of CILOs to Teaching and Assessment Strategies

### i. Alignment of Knowledge and Understanding CILOs:

Knowledge and Understanding CILOs		Teaching Strategies	Assessment Strategies
a1.	Identify the principles of manufacturing systems engineering.	<ul style="list-style-type: none"> <li>▪ Lectures,</li> <li>▪ Seminars,</li> <li>▪ Self-Learning Problems/Studies,</li> <li>▪ Case study,</li> <li>▪ Group/Individual Projects and Studies,</li> <li>▪ Active learning,</li> </ul>	<ul style="list-style-type: none"> <li>▪ Oral &amp; Writing Exams</li> <li>▪ Reports,</li> <li>▪ Survey,</li> <li>▪ Written Exam,</li> <li>▪ Assignments</li> </ul>
a2.	Identify the common production planning approaches and state their impact on manufacturing systems	<ul style="list-style-type: none"> <li>▪ Lectures,</li> <li>▪ Seminars,</li> <li>▪ Self-Learning Problems/Studies,</li> <li>▪ Case study,</li> <li>▪ Group/Individual Projects and Studies,</li> </ul>	<ul style="list-style-type: none"> <li>▪ Oral &amp; Writing Exams</li> <li>▪ Reports,</li> <li>▪ Survey,</li> <li>▪ Written Exam,</li> <li>▪ Assignments</li> </ul>

		▪ Active learning,	
<b>j. Alignment of Intellectual Skills CILOs:</b>			
<b>Intellectual Skills CILOs</b>		<b>Teaching Strategies</b>	<b>Assessment Strategies</b>
b1.	Apply a range of analysis techniques to determine the effectiveness and efficiency of a manufacturing system.	<ul style="list-style-type: none"> <li>▪ Lectures,</li> <li>▪ Project Supervision,</li> <li>▪ Self-Learning,</li> <li>▪ Case Study,</li> <li>▪ Independent Study,</li> <li>▪ Analysis and Problem Solving,</li> <li>▪ Brainstorming,</li> <li>▪ Presentations,</li> </ul>	<ul style="list-style-type: none"> <li>▪ Oral &amp; Writing Exams</li> <li>▪ Reports,</li> <li>▪ Survey,</li> <li>▪ Written Exam,</li> <li>▪ Assignments</li> </ul>
b2.	Analyze the impact of different production planning approaches on the effectiveness of a manufacturing system.	<ul style="list-style-type: none"> <li>▪ Lectures,</li> <li>▪ Project Supervision,</li> <li>▪ Self-Learning,</li> <li>▪ Case Study,</li> <li>▪ Independent Study,</li> <li>▪ Analysis and Problem Solving,</li> <li>▪ Brainstorming,</li> <li>▪ Presentations,</li> </ul>	<ul style="list-style-type: none"> <li>▪ Oral &amp; Writing Exams</li> <li>▪ Reports,</li> <li>▪ Survey,</li> <li>▪ Written Exam,</li> <li>▪ Assignments</li> </ul>
<b>k. Alignment of Professional and Practical Skills CILOs:</b>			
<b>Professional and Practical Skills CILOs</b>		<b>Teaching Strategies</b>	<b>Assessment Strategies</b>
c1.	Develop an appropriate future state for a manufacturing system.	<ul style="list-style-type: none"> <li>▪ Lectures,</li> <li>▪ Project Supervision,</li> <li>▪ Laboratory Works,</li> <li>▪ Self-Learning,</li> <li>▪ Case Study,</li> <li>▪ Simulation Exercises,</li> <li>▪ Independent Study,</li> <li>▪ Analysis and Problem Solving,</li> <li>▪ Presentations,</li> </ul>	<ul style="list-style-type: none"> <li>▪ Seminar Report,</li> <li>▪ Written Research Proposal,</li> <li>▪ Thesis and Publication.</li> </ul>
c2.	Evaluate the effectiveness of production planning methods.	<ul style="list-style-type: none"> <li>▪ Lectures,</li> <li>▪ Project Supervision,</li> <li>▪ Laboratory Works,</li> <li>▪ Self-Learning,</li> <li>▪ Case Study,</li> <li>▪ Simulation Exercises,</li> <li>▪ Independent Study,</li> <li>▪ Analysis and Problem Solving,</li> <li>▪ Presentations,</li> </ul>	<ul style="list-style-type: none"> <li>▪ Seminar Report,</li> <li>▪ Written Research Proposal,</li> <li>▪ Thesis and Publication.</li> </ul>
<b>l. Alignment of Transferable (General) Skills CILOs:</b>			
<b>Transferable (General) Skills CILOs</b>		<b>Teaching Strategies</b>	<b>Assessment Strategies</b>

d1.	Conduct independently research that advances and extends knowledge in Manufacturing Systems fields.	<ul style="list-style-type: none"> <li>▪ Dissertation Defenses and Presentation,</li> <li>▪ Independent Study, Presentation,</li> <li>▪ Brainstorming,</li> <li>▪ Presenting Researches,</li> <li>▪ Publish Research Papers.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Written Research Proposal, Thesis and Publication,</li> <li>▪ Written Exam,</li> <li>▪ Assignments,</li> <li>▪ Field Work,</li> <li>▪ Survey, Presentation,</li> <li>▪ Written Report.</li> </ul>
d2.	Engage in independent lifelong learning.	<ul style="list-style-type: none"> <li>▪ Dissertation Defenses and Presentation,</li> <li>▪ Independent Study, Presentation,</li> <li>▪ Brainstorming,</li> <li>▪ Presenting Researches,</li> <li>▪ Publish Research Papers.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Written Research Proposal, Thesis and Publication,</li> <li>▪ Written Exam,</li> <li>▪ Assignments,</li> <li>▪ Experimental and Field Work,</li> <li>▪ Laboratory Report,</li> <li>▪ Survey, Presentation,</li> <li>▪ Written Report.</li> </ul>

## • Course Content

### 7. Theoretical Aspect

Order	Topic List / Units	Sub -Topics List	Number of Weeks	Contact Hours	Course ILOs
1	Fundamentals of Manufacturing	<ul style="list-style-type: none"> <li>▪ Fundamentals of Manufacturing</li> <li>▪ Definitions of production and manufacturing</li> <li>▪ Principles of manufacturing</li> <li>▪ Production inputs, outputs, and processes.</li> <li>▪ Production organization</li> </ul>	1	3	a1, a2
2	Fundamentals of Manufacturing Systems	<ul style="list-style-type: none"> <li>▪ Manufacturing systems</li> <li>▪ Structural of manufacturing systems</li> <li>▪ Transformational aspect of manufacturing systems</li> <li>▪ Procedural aspect of manufacturing systems</li> <li>▪ Integrated manufacturing systems (IMS)</li> </ul>	1	3	a1, a2
3	Modes of Production	<ul style="list-style-type: none"> <li>▪ <i>Types</i> of production</li> <li>▪ Mass production</li> <li>▪ Multi-product, small-batch production</li> </ul>	1	3	a1, a2
4	Integrated Manufacturing and Management Systems	<ul style="list-style-type: none"> <li>▪ Basic functions and structures of management systems</li> <li>▪ Basic framework of integrated manufacturing management systems</li> <li>▪ Framework of an integrated manufacturing system</li> <li>▪ Logistic systems</li> <li>▪ Material flow</li> <li>▪ Technological information flow</li> </ul>	1	3	a1, a2, b1
5	Product Planning and Design	<ul style="list-style-type: none"> <li>▪ Product Planning</li> <li>▪ Product design</li> <li>▪ Product structure and explosion</li> </ul>	1	3	a1, a2, b1, b2

6	Process Planning and Design	<ul style="list-style-type: none"> <li>▪ Scope and problems of process planning</li> <li>▪ Process design</li> <li>▪ Operation design</li> <li>▪ Optimum routing analysis</li> <li>▪ Line balancing</li> </ul>	1	3	a1, a2, b1,b2
7	Layout and logistic "Planning and Design"	<ul style="list-style-type: none"> <li>▪ Scope and problems of layout planning</li> <li>▪ Systematic layout planning (SLP)</li> <li>▪ Mathematical layout design</li> <li>▪ Production flow analysis</li> <li>▪ Logistic Planning and Design</li> <li>▪ Transportation problems</li> <li>▪ Distribution problems</li> </ul>	1	3	a1, a2, b1,b2, c1,c2
8	Midterm Exam	<ul style="list-style-type: none"> <li>▪ <i>All previous topics</i></li> </ul>	1	3	a1, a2, b1,b2, c1,c2
9	Manufacturing Optimization	<ul style="list-style-type: none"> <li>▪ Evaluation criteria for manufacturing optimization</li> <li>▪ Optimization of single-stage manufacturing</li> <li>▪ Optimization of multistage manufacturing systems</li> </ul>	1	3	a1, a2, b1,b2, c1,c2
10	Aggregate Production Planning	<ul style="list-style-type: none"> <li>▪ Production planning</li> <li>▪ Short-term production planning</li> <li>▪ Multiple-objective production planning</li> <li>▪ Product mix analysis</li> <li>▪ Lot-size analysis</li> <li>▪ Material requirements planning (MRP) and machine loading</li> <li>▪ Long-term production planning</li> <li>▪ Production forecasting</li> </ul>	1	3	a1, a2, b1,b2, c1,c2, d1, d2
11	Production Scheduling	<ul style="list-style-type: none"> <li>▪ Scope of production scheduling</li> <li>▪ Operations scheduling</li> <li>▪ Project scheduling— PERT and CPM</li> </ul>	1	3	a1, a2, b1,b2, c1,c2, d1, d2

12	Inventory Management	<ul style="list-style-type: none"> <li>▪ Inventory function in manufacturing</li> <li>▪ Fundamentals of inventory analysis</li> <li>▪ Inventory systems</li> <li>▪ Multiple-product inventory management</li> <li>▪ Probabilistic inventory models</li> </ul>	1	3	a1, a2, b1,b2, c1,c2, d1, d2
13	Production Control	<ul style="list-style-type: none"> <li>▪ Scope and problems of production control</li> <li>▪ Process control</li> <li>▪ Just-in-time (JIT) production</li> <li>▪ Productive maintenance</li> </ul>	1	3	a1, a2, b1,b2, c1,c2, d1, d2
14	Manufacturing Cost and Product Cost Structure	<ul style="list-style-type: none"> <li>▪ Value/cost flow in manufacturing systems</li> <li>▪ Concepts of cost and time-series value of money</li> <li>▪ Classification of costs</li> <li>▪ Product cost structure</li> <li>▪ Selling price</li> <li>▪ Computing the manufacturing cost</li> </ul>	1	3	a1, a2, b1,b2, c1,c2, d1, d2
15	Profit Planning, Break-even Analysis and capital investment	<ul style="list-style-type: none"> <li>▪ Profit planning</li> <li>▪ Break-even analysis</li> <li>▪ Investment for manufacturing automation</li> <li>▪ Evaluation methods of capital investment</li> </ul>	1	3	a1, a2, b1,b2, c1,c2, d1, d2
16	Final Exam		1	3	a1, a2, b1,b2, c1,c2, d1, d2
<b>Number of Weeks /and Contact Hours Per Semester</b>			<b>16</b>	<b>48</b>	

### 8. Practical Aspect

Order	Practical / Tutorials topics	Number of Weeks	Contact Hours	Course ILOs
1	▪ None			

### 9. Tutorial Aspect:

No.	Tutorial	Number of Weeks	Contact Hours	Learning Outcomes (CLOs)
1	None			



### • Teaching Strategies:

- Lectures
- Seminars
- Self-Learning Problems/Studies
- Case study
- Group/Individual Projects and Studies
- Active learning
- Project Supervision
- Self-Learning
- Independent Study
- Analysis and Problem Solving
- Brainstorming
- Presentations
- Laboratory Works
- Simulation Exercises
- Presentations
- Dissertation Defenses and Presentation
- Presentation
- Presenting Researches
- Publish Research Papers.

### • Assessment Methods of the Course:

- Oral & Writing Exams
- Reports,
- Survey,
- Written Exam,
- Assignments Seminar Report,
- Written Research Proposal,
- Thesis and Publication,
- Assignments,
- Field Work,
- Presentation,

### • Tasks and Assignments:

No	Assignments/ Tasks	Individual/ Group	Mark	Week Due	CILOs (symbols)
1	Homework	Individual	10	Weekly	a1, a2, b1, b2, c1, c2
2	Project	Individual	20	9 <sup>th</sup> week	a1, a2, b1, b2, c1, c2,

					c3
<b>Total Score</b>			<b>30</b>	<b>==</b>	<b>===</b>

<b>• Learning Assessment:</b>					
No.	Assessment Tasks	Week due	Mark	Proportion of Final Assessment	CILOs
1	Tasks and Assignments	9 <sup>th</sup> week	30	30%	a1, a2, b1, b2, c1, c2, c3
	Midterm Exam	8 <sup>th</sup> week	20	20%	a1, a2, b1,b2, c1,c2
3	Final Exam (Theoretical)	16 <sup>th</sup> week	50	50%	All CILOs
<b>Total</b>				<b>100%</b>	<b>===</b>

<b>• Learning Resources :</b>
<b>7. Required Textbook(s) :</b>
<p>3. Richard E. Gustavson: (2010) "Production Systems Engineering Cost and Performance Optimization, McGraw-Hill Companies- ISBN: 978-0-07-170189-1</p> <p>4. Katsundo Hitomi: (1996) "Manufacturing Systems Engineering, 2<sup>nd</sup> Edition, Taylor &amp; Francis, ISBN978-0-7484-0324-0.</p>
<b>8. Essential References:</b>
<p>5. George Chryssolouris (2006) "Manufacturing Systems Theory and Practice (2<sup>nd</sup> Ed.)" Springer ISBN978-0-387-25683-2.</p> <p>6. Katsundo Hitomi: (2008)"Introduction to Manufacturing Systems Engineering (5<sup>th</sup> Ed.)" (Kyoritsu Publishing, ISBN978-4-320-08172-7, in Japanese.</p>
<b>9. Electronic Materials and Web Sites etc.</b>
<p>1- Arena Simulation Software (assembly line balancing, flow analysis,...).</p> <p>2- CRAFT Plant-Layout Software.</p> <p>3- Production Planning and Control Software.</p>

### .iii الضوابط والسياسات المتبعة في المقرر Course Policies

بعد الرجوع للوائح الجامعة يتم كتابة السياسة العامة للمقرر فيما يتعلق بالآتي:

1	<b>سياسة حضور الفعاليات التعليمية Class Attendance:</b> - يلتزم الطالب بحضور 75% من المحاضرات ويحرم في حال عدم الوفاء بذلك. - يقدم أستاذ المقرر تقريراً بحضور وغياب الطلاب للقسم ويحرم الطالب من دخول الامتحان في حال تجاوز الغياب 25% ويتم إقرار الحرمان من مجلس القسم.
2	<b>الحضور المتأخر Tardy:</b> - يسمح للطالب حضور المحاضرة إذا تأخر لمدة ربع ساعة لثلاث مرات في الفصل الدراسي، وإذا تأخر زيادة عن ثلاث مرات يحذر شفويًا من أستاذ المقرر، وعند عدم الالتزام يمنع من دخول المحاضرة.
3	<b>ضوابط الامتحان Exam Attendance/Punctuality:</b> - لا يسمح للطالب دخول الامتحان النهائي إذا تأخر مقدار (20) دقيقة من بدء الامتحان - إذا تغيب الطالب عن الامتحان النهائي تطبق اللوائح الخاصة بنظام الامتحان في الكلية.
4	<b>التعيينات والمشاريع Assignments &amp; Projects:</b> - يحدد أستاذ المقرر نوع التعيينات في بداية الفصل ويحدد مواعيد تسليمها وضوابط تنفيذ التكاليف وتسليمها. - إذا تأخر الطالب في تسليم التكاليف عن الموعد المحدد يحرم من درجة التكاليف الذي تأخر في تسليمه.
5	<b>الغش Cheating:</b> - في حال ثبوت قيام الطالب بالغش في الامتحان النصفى أو النهائي تطبق عليه لائحة شؤون الطلاب. - في حال ثبوت قيام الطالب بالغش أو النقل في التكاليف والمشاريع يحرم من الدرجة المخصصة للتكاليف.
6	<b>الانتحال Plagiarism:</b> - في حالة وجود شخص ينتحل شخصية طالب لأداء الامتحان نيابة عنه تطبق اللائحة الخاصة بذلك
7	<b>سياسات أخرى Other policies:</b> - أي سياسات أخرى مثل استخدام الموبايل أو مواعيد تسليم التكاليف ..... الخ

Academic Year: 2021-2022

## Course Plan (Syllabus): Modern Manufacturing Systems

### • Information about Faculty Member Responsible for the Course:

Name	Dr Abdullah Dhaiban	Office Hours					
Location & Telephone No.	Mechatronics Dep.	SAT	SUN	MON	TUE	WED	THU
E-mail	<a href="mailto:A.dhaiban@su.edu.ye">A.dhaiban@su.edu.ye</a> <a href="mailto:Adaiban2@gmail.com">Adaiban2@gmail.com</a>						

### • General information about the course:

19	Course Title	<b>Modern Manufacturing Systems</b>				
20	Course Code and Number	<b>(MTE551)</b>				
21	Credit Hours	Credit Hours			Total	
		Lecture	Practical	Seminar/Tutorial		
22	Study Level and Semester	1 <sup>st</sup> Semester				
23	Pre-requisites	None				
24	Co –requisite	None				
25	Program (s) in which the course is offered	MSc. In Mechatronics Engineering Program				
26	Language of teaching the course	English				
27	Location of teaching the course	Faculty of Engineering				

### • Course Description:

Manufacturing systems engineering is concerned with the design and on-going operation and enhancement of the integrated elements within a manufacturing system, which is a very complex activity, even for simple products. The aim of this course is to develop students' understanding of that complexity within a modern manufacturing environment. This course covers elements that make up a manufacturing system, including production engineering, plant and maintenance engineering, product design, logistics, production planning and control, forecast quality assurance, accounting and purchasing, all of which work together within the manufacturing system to create products that meet customers' requirements.

### • Course Intended Learning Outcomes (CILOs):

Upon successful completion of **Modern Manufacturing Systems Course**, the graduates will be able to:

- a1 Identify the principles of manufacturing systems engineering.
- a2 - Identify the common production planning approaches and state their impact on manufacturing systems
- b1- Apply a range of analysis techniques to determine the effectiveness and efficiency of a manufacturing system.
- b2- Analyze the impact of different production planning approaches on the effectiveness of a manufacturing system.
- c1- Develop an appropriate future state for a manufacturing system.
- c2- Evaluate the effectiveness of production planning methods.
- d1- Conduct independently research that advances and extends knowledge in Manufacturing Systems fields.
- d2- Engage in independent lifelong learning.

• **Course Content:**

**4. Theoretical Aspect:**

Order	Units	Sub Topics	Week Due	Contact Hours
1	Fundamentals of Manufacturing	<ul style="list-style-type: none"> <li>▪ Fundamentals of Manufacturing</li> <li>▪ Definitions of production and manufacturing</li> <li>▪ Principles of manufacturing</li> <li>▪ Production inputs, outputs, and processes.</li> <li>▪ Production organization</li> </ul>	1	3
2	Fundamentals of Manufacturing Systems	<ul style="list-style-type: none"> <li>▪ Manufacturing systems</li> <li>▪ Structural of manufacturing systems</li> <li>▪ Transformational aspect of manufacturing systems</li> <li>▪ Procedural aspect of manufacturing systems</li> <li>▪ Integrated manufacturing systems (IMS)</li> </ul>	1	3

3	Modes of Production	<ul style="list-style-type: none"> <li>▪ <i>Types</i> of production</li> <li>▪ Mass production</li> <li>▪ Multi-product, small-batch production</li> </ul>	1	3
4	Integrated Manufacturing and Management Systems	<ul style="list-style-type: none"> <li>▪ Basic functions and structures of management systems</li> <li>▪ Basic framework of integrated manufacturing management systems</li> <li>▪ Framework of an integrated manufacturing system</li> <li>▪ Logistic systems</li> <li>▪ Material flow</li> <li>▪ Technological information flow</li> </ul>	1	3
5	Product Planning and Design	<ul style="list-style-type: none"> <li>▪ Product Planning</li> <li>▪ Product design</li> <li>▪ Product structure and explosion</li> <li>▪</li> </ul>	1	3
6	Process Planning and Design	<ul style="list-style-type: none"> <li>▪ Scope and problems of process planning</li> <li>▪ Process design</li> <li>▪ Operation design</li> <li>▪ Optimum routing analysis</li> <li>▪ Line balancing</li> </ul>	1	3
7	Layout and logistic "Planning and Design"	<ul style="list-style-type: none"> <li>▪ Scope and problems of layout planning</li> <li>▪ Systematic layout planning (SLP)</li> <li>▪ Mathematical layout design</li> <li>▪ Production flow analysis</li> <li>▪ Logistic Planning and Design</li> <li>▪ Transportation problems</li> <li>▪ Distribution problems</li> </ul>	1	3
8	Midterm Exam	<ul style="list-style-type: none"> <li>▪ <i>All previous topics</i></li> </ul>	1	3

9	Manufacturing Optimization	<ul style="list-style-type: none"> <li>▪ Evaluation criteria for manufacturing optimization</li> <li>▪ Optimization of single-stage manufacturing</li> <li>▪ Optimization of multistage manufacturing systems</li> </ul>	1	3
10	Aggregate Production Planning	<ul style="list-style-type: none"> <li>▪ Production planning</li> <li>▪ Short-term production planning</li> <li>▪ Multiple-objective production planning</li> <li>▪ Product mix analysis</li> <li>▪ Lot-size analysis</li> <li>▪ Material requirements planning (MRP) and machine loading</li> <li>▪ Long-term production planning</li> <li>▪ Production forecasting</li> </ul>	1	3
11	Production Scheduling	<ul style="list-style-type: none"> <li>▪ Scope of production scheduling</li> <li>▪ Operations scheduling</li> <li>▪ Project scheduling— PERT and CPM</li> </ul>	1	3
12	Inventory Management	<ul style="list-style-type: none"> <li>▪ Inventory function in manufacturing</li> <li>▪ Fundamentals of inventory analysis</li> <li>▪ Inventory systems</li> <li>▪ Multiple-product inventory management</li> <li>▪ Probabilistic inventory models</li> </ul>	1	3
13	Production Control	<ul style="list-style-type: none"> <li>▪ Scope and problems of production control</li> <li>▪ Process control</li> <li>▪ Just-in-time (JIT) production</li> <li>▪ Productive maintenance</li> </ul>	1	3
14	Manufacturing Cost and Product Cost Structure	<ul style="list-style-type: none"> <li>▪ Value/cost flow in manufacturing systems</li> <li>▪ Concepts of cost and time-series value of money</li> <li>▪ Classification of costs</li> <li>▪ Product cost structure</li> <li>▪ Selling price</li> <li>▪ Computing the manufacturing cost</li> </ul>	1	3

15	Profit Planning, Break-even Analysis and capital investment	<ul style="list-style-type: none"> <li>▪ Profit planning</li> <li>▪ Break-even analysis</li> <li>▪ Investment for manufacturing automation</li> <li>▪ Evaluation methods of capital investment</li> </ul>	1	3
16	Final Exam	<ul style="list-style-type: none"> <li>▪ All previous topics</li> </ul>	1	3
<b>Number of Weeks /and Contact Hours Per Semester</b>			<b>16</b>	<b>48</b>

### 5. Practical Aspect

Order	Practical / Tutorials topics	Number of Weeks	Contact Hours	Course ILOs
1	<ul style="list-style-type: none"> <li>▪ None</li> </ul>			
<b>Number of Weeks /and Contact Hours Per Semester</b>				

### 6. Training/ Tutorials/ Exercises Aspects:

Order	Tutorials/ Exercises	Week Due	Contact Hours
1	<ul style="list-style-type: none"> <li>▪ None</li> </ul>		
<b>Number of Weeks /and Contact Hours Per Semester</b>			

### • Teaching Strategies:

- Lectures
- Seminars
- Self-Learning Problems/Studies
- Case study
- Group/Individual Projects and Studies
- Active learning
- Project Supervision
- Self-Learning
- Independent Study
- Analysis and Problem Solving
- Brainstorming
- Presentations



- Laboratory Works
- Simulation Exercises
- Presentations
- Dissertation Defenses and Presentation
- Presentation
- Presenting Researches
- Publish Research Papers.

### • Assessment Methods of the Course:

- Oral & Writing Exams
- Reports,
- Survey,
- Written Exam,
- Assignments Seminar Report,
- Written Research Proposal,
- Thesis and Publication,
- Assignments,
- Field Work,
- Presentation,

### • Tasks and Assignments:

No	Assignments	Individual /Groups	Mark	Week Due
1	Homework	Individual	10	Weekly
2	Project	Individual	20	9 <sup>th</sup> week
Total Score			30	

### • Learning Assessment:

No	Assessment Method	Week Due	Mark	Proportion of Final Assessment %
1	Tasks and Assignments	9 <sup>th</sup> week	30	30%
2	Midterm Exam	8 <sup>th</sup> week	20	20%
3	Final Exam (Theoretical)	16 <sup>th</sup> week	50	50%
المجموع Total			100	100 %

### • Learning Resources:

#### 4. Required Textbook(s) :

3. Richard E. Gustavson: (2010) "Production Systems Engineering Cost and Performance

Optimization, McGraw-Hill Companies- ISBN: 978-0-07-170189-1

4. Katsundo Hitomi: (1996) "Manufacturing Systems Engineering, 2<sup>nd</sup> Edition, Taylor & Francis, ISBN978-0-7484-0324-0.

#### 5. Essential References:

5. George Chryssolouris (2006) "Manufacturing Systems Theory and Practice (2<sup>nd</sup> Ed.)" Springer ISBN978-0-387-25683-2.
6. Katsundo Hitomi: (2008) "Introduction to Manufacturing Systems Engineering (5<sup>th</sup> Ed.)" (Kyoritsu Publishing, ISBN978-4-320-08172-7, in Japanese.

#### 6. Electronic Materials and Web Sites etc.

- 1- Arena Simulation Software (assembly line balancing, flow analysis,...).
- 2- CRAFT Plant-Layout Software.  
Production Planning and Control Software.

### iv. الضوابط والسياسات المتبعة في المقرر Course Policies

بعد الرجوع للوائح الجامعة يتم كتابة السياسة العامة للمقرر فيما يتعلق بالآتي:

1	<b>سياسة حضور الفعاليات التعليمية Class Attendance:</b> - يلتزم الطالب بحضور 75% من المحاضرات ويحرم في حال عدم الوفاء بذلك. - يقدم أستاذ المقرر تقريراً بحضور وغياب الطلاب للقسم ويحرم الطالب من دخول الامتحان في حال تجاوز الغياب 25% ويتم إقرار الحرمان من مجلس القسم.
2	<b>الحضور المتأخر Tardy:</b> - يسمح للطالب حضور المحاضرة إذا تأخر لمدة ربع ساعة لثلاث مرات في الفصل الدراسي، وإذا تأخر زيادة عن ثلاث مرات يحذر شفوياً من أستاذ المقرر، وعند عدم الالتزام يمنع من دخول المحاضرة.
3	<b>ضوابط الامتحان Exam Attendance/Punctuality:</b> - لا يسمح للطالب دخول الامتحان النهائي إذا تأخر مقدار (20) دقيقة من بدء الامتحان. - إذا تغيب الطالب عن الامتحان النهائي تطبق اللوائح الخاصة بنظام الامتحان في الكلية.
4	<b>التعيينات والمشاريع Assignments &amp; Projects:</b> - يحدد أستاذ المقرر نوع التعيينات في بداية الفصل ويحدد مواعيد تسليمها وضوابط تنفيذ التكاليف وتسليمها. - إذا تأخر الطالب في تسليم التكاليف عن الموعد المحدد يحرم من درجة التكاليف الذي تأخر في تسليمه.
5	<b>الغش Cheating:</b> - في حال ثبوت قيام الطالب بالغش في الامتحان النصفى أو النهائي تطبق عليه لائحة شؤون الطلاب. - في حال ثبوت قيام الطالب بالغش أو النقل في التكاليف والمشاريع يحرم من الدرجة المخصصة للتكاليف.
6	<b>الانتحال Plagiarism:</b> - في حالة وجود شخص ينتحل شخصية طالب لأداء الامتحان نيابة عنه تطبق اللائحة الخاصة بذلك
7	<b>سياسات أخرى Other policies:</b> - أي سياسات أخرى مثل استخدام الموبايل أو مواعيد تسليم التكاليف .... الخ