



# Engineering Program

<b>Specialization</b>	Mechanical Design
<b>Course Number</b>	20202241
<b>Course Title</b>	Metal Cutting
<b>Credit Hours</b>	3
<b>Theoretical Hours</b>	3
<b>Practical Hours</b>	0



❖ تطبق هذه الخطة الدراسية اعتباراً من بداية العام الجامعي 2009/2008

**Brief Course Description:**

- ❖ This course will resume the study of machining principles with an emphasis on the mechanics of chip formation and cutting forces. Cutting tool material and its geometry, Machinability and the factors that influence tool life, surface integrity and machining power.

**Course Objectives:**

This course aims at:

1. Determine suitable operating conditions for various cutting processes.
2. Operate and control the cutting machines properly.
3. Plan for products and determine the required manufacturing phases.



**Detailed Course Description:**

Unit Number	Unit Name	Unit Content	Time Needed
1.	Cutting theory		
2.	Cutting tools	<ul style="list-style-type: none"> <li>▪ Cutting tool materials</li> <li>▪ Cutting tools geometry</li> <li>▪ Cutting forces</li> </ul>	
3.	Cutting Forces Drilling	<ul style="list-style-type: none"> <li>▪ Cutting tools</li> <li>▪ Cutting variables (feed rate, cutting depth, cutting speed, rotation speed)</li> <li>▪ Cutting time</li> </ul>	
4.	Turning	<ul style="list-style-type: none"> <li>▪ Cutting tools</li> <li>▪ Cutting variables (feed rate, cutting depth, cutting speed, rotation speed)</li> <li>▪ Cutting time</li> </ul>	
5.	Milling	<ul style="list-style-type: none"> <li>▪ Cutting tools</li> <li>▪ Cutting variables (feed rate, cutting depth, cutting speed, rotation speed)</li> <li>▪ Cutting time</li> </ul>	
6.	Grinding	<ul style="list-style-type: none"> <li>▪ Abrasives</li> <li>▪ Grinding wheels (materials, mounting)</li> <li>▪ Grinding processes</li> </ul>	
7.	Cooling	<ul style="list-style-type: none"> <li>▪ Distribution of heat</li> <li>▪ Cooling fluids</li> <li>▪ Cooling methods</li> </ul>	

❖ تطبق هذه الخطة الدراسية اعتباراً من بداية العام الجامعي 2009/2008

**Evaluation Strategies:**

Exams		Percentage	Date
Exams	First Exam	20%	--/--/----
	Second Exam	20%	--/--/----
	Final Exam	50%	--/--/----
Homework and Projects		10%	
Discussions and lecture Presentations			

**Teaching Methodology:**

- ❖ Lectures

**Text Books & References:**

1. Material and processes in manufacturing, Paul Degarmo.
2. Introduction to Manufacturing Process, John A. Schey.
3. Manufacturing Engineering and Technology, Kalpakjian S., 5th edition, Prentice Hall 2005.
4. The Science and Engineering of materials, Askeland, D.R., 5th edition, Thomson 2006.



❖ تطبق هذه الخطة الدراسية اعتباراً من بداية العام الجامعي 2009/2008



# Engineering Program

<b>Specialization</b>	Mechanical Design
<b>Course Number</b>	20202242
<b>Course Title</b>	Metal Cutting Workshops
<b>Credit Hours</b>	1
<b>Theoretical Hours</b>	0
<b>Practical Hours</b>	3



❖ تطبق هذه الخطة الدراسية اعتباراً من بداية العام الجامعي 2009/2008

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**Brief Course Description:**

- ❖ Operating different kinds of machine tools( Drilling, Turning, Milling, Grinding) safely and be able to trouble shoot machining problems as they arise.

**Course Objectives:**

This course aims at:

1. Determine suitable operating conditions for various cutting processes.
2. Operate and control the cutting machines properly.
3. Plan for products and determine the required manufacturing phases.



**Detailed Course Description:**

Unit Number	Unit Name	Unit Content	Time Needed
1.	<b>Drilling</b>	<ul style="list-style-type: none"> <li>▪ Types and mounting of twist drills</li> <li>▪ Sharpening of twist drills</li> <li>▪ Reaming</li> <li>▪ Principles of safety for drilling processes</li> </ul>	
2.	<b>Turning</b>	<ul style="list-style-type: none"> <li>▪ Different types of lathes and their components</li> <li>▪ Cutting tools</li> <li>▪ Mounting of work pieces on lathes</li> <li>▪ Longitudinal, face, and internal turning</li> <li>▪ Taper turning</li> <li>▪ Internal and external thread cutting</li> <li>▪ Eccentric Turning</li> </ul>	
3.	<b>Milling</b>	<ul style="list-style-type: none"> <li>▪ Different types of milling machines and their components</li> <li>▪ Milling cutting tools (milling cutters) and their uses</li> <li>▪ Mounting and of milling cutters</li> <li>▪ Manufacturing of flat surfaces of specified dimensions</li> <li>▪ Grooving</li> <li>▪ Using dividing tool</li> <li>▪ Gear cutting</li> </ul>	
4.	<b>Grinding</b>	<ul style="list-style-type: none"> <li>▪ Grinding wheels</li> <li>▪ Mounting arrangements</li> <li>▪ Grinding of flat surfaces</li> <li>▪ External grinding of cylindrical surfaces</li> <li>▪ Internal grinding of cylindrical surfaces</li> </ul>	

❖ تطبق هذه الخطة الدراسية اعتباراً من بداية العام الجامعي 2009/2008



**Evaluation Strategies:**

Exams		Percentage	Date
Exams	Reports	30%	--/--/----
	Midterm Exam	20%	--/--/----
	Final Exam	50%	--/--/----

**Teaching Methodology:**

- ❖ Workshops

**Text Books & References:**

1. "Technology of production and workshops", Shapman, part I.
2. Workshop technology by W. A. J. Chapion.
3. Material and processes in manufacturing, Paul Degarmo.
4. Introduction to Manufacturing Process, John A. Schey.
5. Manufacturing Engineering and Technology, Kalpakjian S., 5th edition, Prentice Hall 2005.
6. The Science and Engineering of materials, Askeland, D.R., 5th edition, Thomson 2006.







# Engineering Program

<b>Specialization</b>	Common
<b>Course Number</b>	20202113
<b>Course Title</b>	Manufacturing Processes
<b>Credit Hours</b>	2
<b>Theoretical Hours</b>	2
<b>Practical Hours</b>	0



❖ تطبق هذه الخطة الدراسية اعتباراً من بداية العام الجامعي 2009/2008

**Brief Course Description:**

- ❖ Introduction, metal casting, metal forming and shaping, forging of metals, extrusion and drawing of metals, fusion welding process, quality assurance, testing and inspecting, human factors engineering, safety and product liability.

**Course Objectives:**

This course aims at:

1. To provide student's with an introduction to the means and methodologies used by engineers in the production process.
2. Student will be introduced to the properties and methods of production of ferrous and nonferrous metals, different manufacturing processes such as sand casting, hot and cold forming of metals, welding, metal cutting and quality assurance.



**Detailed Course Description:**

Unit Number	Unit Name	Unit Content	Time Needed
1.	<b>Dimension Measurement</b>	-Basic terminology of measurements -Design principles of measurements Devices. (calipers, micrometers) - Types and grades of gauges blocks	
2.	<b>Angle Measurements</b>	-Methods of angular measurements - Using Sine bar - Methods of slope measurement	
3.	<b>Tolerances and fits</b>	- Tolerance and fits specifications - Tolerance table	
4.	<b>Metal Casting Process</b>	<ul style="list-style-type: none"> <li>▪ Fundamentals</li> <li>▪ sand casting</li> <li>▪ die casting</li> </ul>	1 week
5.	<b>Forming, Shaping of Metals</b>	<ul style="list-style-type: none"> <li>▪ Introduction</li> <li>▪ flat rolling, flat rolling practice</li> <li>▪ rolling mills, shape rolling operations</li> </ul>	



❖ تطبق هذه الخطة الدراسية اعتباراً من بداية العام الجامعي 2009/2008



6.	<b>Forging of Metals</b>	<ul style="list-style-type: none"> <li>▪ Introduction</li> <li>▪ open die forging</li> <li>▪ impression die and closed die forging</li> <li>▪ rotary swaging</li> </ul>	
7.	<b>Extrusion and Drawing of Metals</b>	<ul style="list-style-type: none"> <li>▪ Introduction</li> <li>▪ extrusion process and practice</li> <li>▪ drawing process, drawing practice</li> </ul>	
8.	<b>Fusion Welding Process</b>	<ul style="list-style-type: none"> <li>▪ Introduction</li> <li>▪ Arc welding process : (consumable electrodes), (non consumable electrodes), (MIG and TIG)</li> <li>▪ ox fuel gas welding</li> <li>▪ resistance welding</li> </ul>	
9.	<b>Quality Assurance, Testing and Inspecting</b>	<ul style="list-style-type: none"> <li>▪ Introduction</li> <li>▪ product quality, quality assurance</li> <li>▪ total quality management</li> <li>▪ ISO and QS standard</li> <li>▪</li> </ul>	
10.	<b>Human Factors Engineering, Safety and Product Liability</b>	<ul style="list-style-type: none"> <li>▪ Introduction</li> <li>▪ human factor engineering, safety</li> </ul>	

❖ تطبق هذه الخطة الدراسية اعتباراً من بداية العام الجامعي 2009/2008

**Evaluation Strategies:**

Exams		Percentage	Date
Exams	First Exam	20%	--/--/----
	Second Exam	20%	--/--/----
	Final Exam	50%	--/--/----
Homework and Projects		10%	
Discussions and lecture Presentations			

**Teaching Methodology:**

- ❖ Lectures

**Text Books & References:**

**Textbook:**

1. Manufacturing Engineering and Technology, 5.edition, Serope Kalpkjian and Steven Schmid.

**References:**

1. Manufacturing Processes and Systems, 9 edition, Phillip Ostwald and Jairo Munoz, John Wiley & Sons, 1997.
2. Material and Processes in Manufacturing Diagram, Black and koser, 1988.



❖ تطبق هذه الخطة الدراسية اعتباراً من بداية العام الجامعي 2009/2008



# Engineering Program

<b>Specialization</b>	Common
<b>Course Number</b>	20202114
<b>Course Title</b>	Manufacturing Processes Workshops
<b>Credit Hours</b>	1
<b>Theoretical Hours</b>	0
<b>Practical Hours</b>	3



❖ تطبق هذه الخطة الدراسية اعتباراً من بداية العام الجامعي 2009/2008

**Brief Course Description:**

- ❖ Application of following processes: forging, Drawing, extrusion, Rolling. Sand Casting and Molding Procedures.

**Course Objectives:**

This course aims at:

1. Operating different types of machines used metal forming.
2. Prepare the sand mould and patterns.
3. Cast different type materials.



**Detailed Course Description:**

Unit Number	Unit Name	Unit Content	Time Needed
1.	Metal sheet forming	<ul style="list-style-type: none"> <li>▪ Bending</li> <li>▪ Rolling</li> <li>▪ Shearing</li> <li>▪ Blanking and Pressing</li> <li>▪ Visits to metal Forming Plants</li> <li>▪ Sand casting:</li> <li>▪ Preparing of sand,</li> <li>▪ Preparing mould</li> <li>▪ Casting of non ferrous metals</li> <li>▪ Visit to casting plants</li> </ul>	

**Evaluation Strategies:**

Exams		Percentage	Date
Exams	First Exam	20%	--/--/----
	Second Exam	20%	--/--/----
	Final Exam	50%	--/--/----
Homework and Projects		10%	
Discussions and lecture Presentations			

**Teaching Methodology:**

- ❖ Laboratory

**Text Books & References:****Text Book:**

1. Manufacturing Engineering and technology, 5th edition, Serope Kalpakjian and Steven R. Schmid, 2006 by Pearson Education, Inc Pearson Prentice Hall USA

**References:**

1. Manufacturing Processes and Systems. Last edition, Phillip F Ostwald and Jairo Munoz, Copyright. 1997 by John Wiley and sons.
2. Production Technology last edition, HMT Bangalore, Tate Mc Grow – Hill Publishing Company.

❖ تطبق هذه الخطة الدراسية اعتباراً من بداية العام الجامعي 2009/2008





# Engineering Program

<b>Specialization</b>	Mechanical Design
<b>Course Number</b>	20204231
<b>Course Title</b>	Mechanical Design 1
<b>Credit Hours</b>	3
<b>Theoretical Hours</b>	2
<b>Practical Hours</b>	3



❖ تطبق هذه الخطة الدراسية اعتباراً من بداية العام الجامعي 2009/2008

**Brief Course Description:**

- ❖ Application of design principles converting stress analysis, fatigue, deflection, fasteners, bolts, belts and chains, springs, and use of manufacturer's data. Computer activities.

**Course Objectives:**

This course aims at:

1. To provide student with an introduction to the means and methodologies used by engineers in the Mechanical design.
2. Student will be introduced to fundamental of mechanical design, stress strain analysis, different Mechanical parts design and selection methods such as Fasteners, springs, shaft, sliding bearing, Gears and coupling.



**Detailed Course Description:**

Unit Number	Unit Name	Unit Content	Time Needed
1.	Stress Analysis	<ul style="list-style-type: none"> <li>Introduction, Concept of stresses, Axial loading, normal stresses, stresses under general loading conditions, component of stresses, stress concentration factors, deflection of beams, fatigue</li> </ul>	
2.	Fastener	<ul style="list-style-type: none"> <li>Screw fasteners, keys, pins, rivets and collars</li> </ul>	
3.	Bolts	<ul style="list-style-type: none"> <li>Strength specification, bolt preload, selecting the nut, centroids of bolts groups 1</li> </ul>	
4.	Chains and Belts	<ul style="list-style-type: none"> <li>Chain versus datum-plane dimensions, roller chain, flat and round belt drives, V-belts</li> </ul>	
5.	Springs	<ul style="list-style-type: none"> <li>Spring material and wire size, torsion bar design, helical compression and tension springs size design</li> </ul>	

**Evaluation Strategies:**

Exams		Percentage	Date
Exams	First Exam	20%	--/--/----
	Second Exam	20%	--/--/----
	Final Exam	50%	--/--/----
Homework and Projects		10%	
Discussions and lecture Presentations			

❖ تطبق هذه الخطة الدراسية اعتباراً من بداية العام الجامعي 2009/2008

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**Teaching Methodology:**

- ❖ Lectures

**Text Books & References:**

**Textbook:**

1. Mechanical Engineering Design, 6 editions, J. Shigley and Mischke.

**References:**

1. Machine Element in Mechanical Design, Robert and Mott.
2. Mechanical Design, Peter Childs.





# Engineering Program

<b>Specialization</b>	Mechanical Design
<b>Course Number</b>	20204226
<b>Course Title</b>	Mechanical Design 2
<b>Credit Hours</b>	3
<b>Theoretical Hours</b>	2
<b>Practical Hours</b>	3



❖ تطبق هذه الخطة الدراسية اعتباراً من بداية العام الجامعي 2009/2008

**Brief Course Description:**

- ❖ Application of design principles converting design of gears, shafts and axis, Bearings, clutches and brakes, power transmission machinery, and use of manufacturer's data. Computer activities.

**Course Objectives:**

This course aims at:

1. To provide student with an introduction to the means and methodologies used by engineers in the Mechanical design.
2. Student will be introduced to fundamental of mechanical design, stress strain analysis, different Mechanical parts design and selection methods such as Gears, shaft, sliding bearing, coupling and power transmission machinery.



❖ تطبق هذه الخطة الدراسية اعتباراً من بداية العام الجامعي 2009/2008

**Detailed Course Description:**

Unit Number	Unit Name	Unit Content	Time Needed
1.	Design of Gears	<ul style="list-style-type: none"> <li>▪ Fundamentals, contact ratio, Gears material and manufacturing</li> <li>▪ selection of gear material, life time of gear tooth, interference, basic teeth dimensions</li> </ul>	
2.	Shafts and axis	<ul style="list-style-type: none"> <li>▪ Power transmitted</li> <li>▪ maximum static shearing stress</li> <li>▪ ASTM code for shafting</li> <li>▪ fluctuating loads on shafts</li> <li>▪ keys and coupling</li> </ul>	
3.	Bearing (Rolling-Contact Bearing)	<ul style="list-style-type: none"> <li>▪ Bearing types, bearing life, bearing load</li> <li>▪ Selection of ball and straight roller bearing</li> </ul>	
4.	Clutches and Brakes	<ul style="list-style-type: none"> <li>▪ Introduction to common types of clutches and brakes: <ul style="list-style-type: none"> <li>- disk brakes</li> <li>- cone clutches and brakes</li> <li>- drum clutches and brakes</li> <li>- band clutches and brakes</li> </ul> </li> </ul>	
5.	Power Transmission Machinery	<ul style="list-style-type: none"> <li>▪ Crank shafts</li> <li>▪ fly wheel</li> <li>▪ bevel gear1</li> <li>▪ worm gear</li> <li>▪ helical gear</li> </ul>	

❖ تطبق هذه الخطة الدراسية اعتباراً من بداية العام الجامعي 2009/2008

**Evaluation Strategies:**

Exams		Percentage	Date
Exams	First Exam	20%	--/--/----
	Second Exam	20%	--/--/----
	Final Exam	50%	--/--/----
Homework and Projects		10%	
Discussions and lecture Presentations			

**Teaching Methodology:**

- ❖ Lecture

**Text Books & References:**

**Textbook:**

1. Mechanical Engineering Design, 6 edition, J. Shigley and Mischke.

**References:**

1. Machine Element in Mechanical Design, Robert and Mott.
2. Mechanical Design, Peter Childs.

