Engineering Program

Specialization	**CNC Machining Technology**
Course Number	**20212141**
Course Title	**Metals Machining Technology**
Credit Hours	**(2)**
Theoretical Hours	**(2)**
Practical Hours	**(0)**

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

Brief Course Description:

- Introduction to cutting and machining, holding devices, lubricants and cutting fluids, sawing operation and power sawing (hacksaws, band saws), drilling, milling machines, drilling operation, lathe and lathe operation, lathe cutting tools, cutting parameters, milling machines and milling operations, cutting parameters, work piece holding devices and accessories, shaping, planning, and broaching, precision grinding.

Course Objectives:

At the end of this course student will be able to:

1. Understand the principles of metal cutting operations.
2. Recognize different types of lathe machines, drilling machines, surface planning machines and milling machines
3. Understand the principles of turning operations, threading, sawing and milling.

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	**Principles of Metal cutting operations**	▪ Turning principles ▪ Drilling principles ▪ Surface planning principles ▪ Milling principles ▪ Boring process ▪ Broaching process ▪ Grinding process ▪ Lubricants & cutting fluids	
2.	**Drilling**	▪ Drilling machines and operations ▪ Vertical Drilling Machines (Accurate, diagonal and turret) ▪ Drilling machines ▪ Drilling speed ▪ Drilling tools (sizes and shapes) ▪ Chips kind in drilling machines ▪ Reamers ▪ Threading taps ▪ Cutting forces calculations	
3.	**Metal Sawing and Sawing operations**	▪ Metal sawing types ▪ Cutting off speeds ▪ Stock cutoff machine (Power hacksaw Sawing, Power band saw) ▪ Blades selection ▪ cutoff machine operations	
4.	**Turning**	▪ Lathes types ▪ Lathes parts ▪ Movement drives methods ▪ Turning cutting tools and their usage ▪ Cutting tools angles ▪ Cutting operation by using machine punches ▪ Cutting operation by using machine chucks	

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

5.	**Tapers turning and threading**	▪ Tapers turning and angles ▪ Turning by using face plate ▪ Gear cutting by using lathes	
6.	**Shapers and Surface Plaining Machines**	▪ Shapers parts ▪ Shapers operations ▪ Surface Plaining machine parts ▪ Surface Plaining operation	
7.	**Milling machine and machine operation**	▪ Types of milling machine ▪ Principal parts of milling machine ▪ milling machine controls & adjustments ▪ milling tools and holders ▪ milling machine options and accessories	
8.	**Precision grinding machine**	▪ Introduction to Precision grinding ▪ Grinding wheels selection ▪ Cylindrical grinding (internal & external) ▪ Surface grinding	

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**

Teaching Methodology:

- Lecture

Text Books & References:

Textbook:

1. Fundamentals of Machine Technology by C. Thomas Olivo.
2. Workshop Technology by W. Chapman, Edward Arnold.

References:

1.

Engineering Program

Specialization	**CNC Machining Technology**
Course Number	**20212261**
Course Title	**Molds design and Manufacturing**
Credit Hours	**2**
Theoretical Hours	**2**
Practical Hours	**0**

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

Brief Course Description:

Introduction to mold design, metal forming process. Classification of iron alloys used for molds. Working characteristic at a given mass and shape of parts. detailed design. Molding process and materials, allowances and tolerance. Design of shearing and bending dies. Design of cores, complex shape.

Course Objectives:

At the end of this course student will be able to:

1. Understand the basic concepts of mold design.
2. Understand the molding process and materials.
3. Study and learn core design and manufacturing process.

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	**Introduction to mold design**	▪ Functional design ▪ Metallurgical design: selection and optimum use of molds ▪ Economic considerations ▪ Metal forming process ▪ Classification of iron alloys used for molds	
2.	**Working characteristics at a given mass and shape of parts**	▪ Minimum section thickness ▪ Cord-hole size ▪ Dimensional tolerances ▪ Surface finish ▪ Dies classification ▪ Machines, materials and tools used in dies manufacturing	
3.	**Molding processes**	▪ Sand molding ▪ Investment molding ▪ Ceramic molding ▪ Plaster molding. ▪ Graphite molding	
4.	**Molds for thin sheet metals (shearing and bending).**	▪ Design of cutting and forming parts ▪ Points of considerations (when design a mold) ▪ Design steps for cutting molds ▪ Shearing and bending force calculations ▪ Tolerances for sheet folding process ▪ Shearing by dies	
5.	**Design of cores, complex shapes, projecting details**	▪ Core making ▪ Core baking ▪ Core setting ▪ Core applications and design	

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. Dies manufacturing Manuals, Prince Al-Hussain Bin Abdallah II Military and Technical college, 1996.
2. Principles of metal casting, Richard W. Heine, Mc Graw Hill.

References:

1. Manufacturing Processes and systems; Philip F. Ostwald; Jairp Munoz, John Wiley & sons; 9th edition, New york 1997.
2. Plastic Injection Mould construction; Ahmed A.Rahman; The Royal scientific society, Amman-Jordan, 1997.
3. علم الصناعة، خراطه و تسويه وصناعه قوالب، وزاره التربية و التعليم، 1996.

Engineering Program

Specialization	**CNC Machining Technology**
Course Number	**20212262**
Course Title	**Molds Design and Manufacturing Workshops**
Credit Hours	**(2)**
Theoretical Hours	**(0)**
Practical Hours	**(6)**

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

Brief Course Description:

- Manufacturing of Shearing and Bending molds. Determination of mold alloys and allowances. Molding processes; sand, investment and ceramic molding . Core design. Using of CAD software in molds design.

Course Objectives:

At the end of this course student will be able to:

1. Learn different skills for design and manufacturing different molds types.
2. Learn types of molds.
3. Learn different materials that can be used in dies manufacturing.
4. Use CAD software to design different shapes of dies.

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	Distinguish between different molds types		
2.	Determine molds specifications		
3.	The importance of allowance and clearance in molds design		
4.	Determination of machines, materials and tools used in molds manufacturing		
5.	Design a mold by using CAD software		
6.	Manufacturing of sheet shearing die		
7.	Manufacturing of sheet bending die		
8.	Exercise of sand molding		
9.	Exercise of investment molding		
10.	Exercise of core design		
11.	Visits to casting and mold design plants		

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:**

Textbook:

1. Dies manufacturing Manuals, Prince Al-Hussain Bin Abdallah II Military and Technical college, 1996.
2. Principles of metal casting, Richard W. Heine, Mc Graw Hill.

Engineering Program

Specialization	**CNC Machining Technology**
Course Number	**20212111**
Course Title	**Mechanical Drafting**
Credit Hours	**2**
Theoretical Hours	**0**
Practical Hours	**6**

Brief Course Description:

- Auxiliary views, temporary fasteners, keys, feathers, splines, rivets, cotters, springs, power-screws, welding symbols. Dimensioning, tolerance, limits and fits (ISO system). Details and working drawings. Reading of mechanical engineering drawings, assembly drawings. Graphics display hardware. Graphics software. Mapping computer graphics standards. Homogeneous representation of solids. 2D and 3D transformations for modeling and viewing. Features for CAD/CAM integration. Applications for CAD modeling.

.

Course Objectives:

At the end of this course student will be able to:

1- Drafting in true size a oblique plans
2- Drafting fasteners
3- Calculate minimum & maximum accepted diameters of holes and shafts
4- Read symbols of welding and surface finishing
5- Use mastercam software to draft works

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	Multiview Drawings	▪ Orthographic projection ▪ Partial views ▪ Alternate positions of views ▪ Laying out the drawing ▪ Primary auxiliary views ▪ True length of oblique line ▪ True size of inclined plane ▪ Full & partial auxiliary views ▪ Secondary auxiliary views	
2.	Fastening Devices	▪ Terminology of fasteners ▪ Threaded fasteners (heads, thread forms inter, exter.) ▪ Keys & key-seats ▪ Washers ▪ Rivets ▪ Cotters ▪ springs (coil, flat, compression, extension., torsion)	
3.	Tolerance & feature control	Definition and application, Standard fits between mating parts, fits systems, feature control symbol placement, tolerance of location, tolerance of form & runout, control of surface quality	
4.	Drafting Welded joints	Definition and application, fusion welding, welding symbol, information in symbol, standard location of weld symbol element on drawings	
5.	Mastercam	▪ Introduction to mastercam ▪ Mastercam interface ▪ Creating line, rectangle and point ▪ Creating 2D part and contour ▪ Copying & transforming operation ▪ Rotating geometry ▪ Cutting the slots ▪ Creating drill tool-paths ▪ Creating 3D view	

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 & classroom tasks
  Application in workshop

Text Books & References:

Textbook:

1- Mastercam ver9 Design tutorial
2- Technical Drafting, William Spence, Dean , Michael B. Atkins, Chas. A. Bennett Co.
3- Engineering Drawing, P. Collier & R. Wilson, Hutchinson of London

References:

Engineering Program

Specialization	**CNC Machining Technology**
Course Number	**20212121**
Course Title	**Mechanical Measurements**
Credit Hours	**2**
Theoretical Hours	**2**
Practical Hours	**0**

Brief Course Description:

- . Principles of linear measurements, linear measurements, standards for measurements (metric and inch), tools of measurements, venires and micrometer angel measurement, combination set, gauge blocks, inspection tools and gauges, dial indicating gauge, surface finish measurements, layout tools, surface plate, angle plate, v-blocks, layout techniques, puncher, dividers.

Course Objectives:

At the end of this course student will be able to:

1. distinguish classifying measuring & layout tools by there accuracy and capacity
2. converting between different measuring systems
3. care of measuring & layout tools
4. testing measuring & layout tools

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	**Introduction**	▪ definitions, importance, Linear measurements metric and USA customary system, measuring units multiplying and divides, conversion between the two systems, care of measuring tools	
2.	**Measurements**	▪ Linear measuring: Steel rule, steel tapes, trammels, kinds, sizes accuracy of vernier caliper, micrometer, transferring measurements between tools. ▪ Angular measurements, steel square, combination set	
3.	**Layout**	▪ definitions, importance, tools for layout: surface plate, angle plate, v-blocks	
4.	**Testing measuring & layout tools**	▪ Testing Steel rule, steel tapes, trammels, kinds, sizes accuracy of vernier caliper, micrometer,	

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. Technical Drafting, William Spence, Dean , Michael B. Atkins, Chas. A. Bennett Co.
2. Engineering Drawing, P. Collier & R. Wilson, Hutchinson of London
3. metalwork Technology and practice, Victor E. Repp, USA

References:

Engineering Program

Specialization	**CNC Machining Technology**
Course Number	**20212122**
Course Title	**Mechanical Measurements lab**
Credit Hours	**1**
Theoretical Hours	**0**
Practical Hours	**3**

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

Brief Course Description:

- . Measuring lengths with tape, metal rulers, calipers and micrometers, measuring angles with protractors combination sets, use of gauges blocks, comparing dimensions and flatness with dial-indicating gauge. Layout using tools and template

.

Course Objectives:

At the end of this course student will be able to:

1. Measuring length up to accuracy of 1/10
2. comparing heights up to accuracy of 1/100
3. layout works using proper techniques

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	**Measuring**	**The student should practicing measuring** **Linear lengths with:** ▪ steel ruler, tapes ▪ vernier caliper, micrometer **Angles with:** ▪ protractors combination sets	
2.	**Layout**	**The student should practicing layout** ▪ Simple shapes with layout tools ▪ Complicated shapes with template	
3.		▪	

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

Teaching Methodology:
Lecture

Text Books & References:
Textbook:

1. Engineering Drawing, P. Collier & R. Wilson, Hutchinson of London
2. metalwork Technology and practice, Victor E. Repp, USA

References:

Engineering Program

Specialization	**Common**
Course Number	20409111
Course Title	**Industrial Supervision**
Credit Hours	**(2)**
Theoretical Hours	**(2)**
Practical Hours	**(0)**

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

Brief Course Description:

- Supervising duties, training knowledge, introduction, job standards, job analysis, training needs assessment, training programs and curriculum, training evaluation, subordinates appraisal, job organization, and production orders forms filling

Course Objectives:

At the end of this course student will be able to:

1. explain job standard
2. study training needs for subordinates
3. elaborate training program
4. conduct and evaluate training
5. fill full appraisal form
6. design production sequence

Detailed Course Description:

Number	Chapter	Content	Time Needed
1.	JOB STANDARDS	▪ Definition, objectives, job levels, uses of job Standard, Vocational Job Standardization Law	
2.	TRAINING NEEDS	▪ Job analyzing, jobs training needs surveying, training needs study	
3.	TRAINING	▪ Curriculum design, training plans, methods of training	
4.	SUPERVISOR DUTIES	▪ Introduction, Position of supervisor in the organization, duties, losses prevention	
5.	PRODUCTION ORGANIZATION	▪ Introduction, definition, steps of production study, (A.S.M.E.) production diagrams,	

Evaluation Strategies:

Exams		Percentage	Date
Exams	Assignments	30%	--/--/----
	Mid-tern exam	20%	--/--/----
	Final practical exam	50%	--/--/----
Homework and Projects			
Discussions and lecture Presentations			

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

Teaching Methodology:

- ❖ Laboratory

Text Books & References:
Text Book:

References:

1. Principles of industrial supervising, phD Al-Najjar Moh'd 2008.
2. VTC documentation

Engineering Program

Specialization	**CNC Machining Technology**
Course Number	**20212221**
Course Title	**Materials Testing**
Credit Hours	**2**
Theoretical Hours	**2**
Practical Hours	**0**

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

Brief Course Description:

- Principles of statics including equilibrium and static equivalence. Determination of moment and force resultants in slender members. Introduction to mechanics of deformable bodies: concepts of stress and strain, classification of materials behavior, stress-strain relations and generalized Hooke's law. Applications to engineering problems involving members under axial load, torsion of circular rods and tubes, bending and shear stresses in beams, combined stresses in beams, combined stresses, deflection of beams, buckling of columns. Methods of materials testing. Equipment and procedures of testing. Standards and references...

Course Objectives:

At the end of this course student will be able to:

1. To explain the concepts of, and the relations between stress and strain.
2. To study the moments, forces, and loads applied on materials.
3. To study the methods, equipments, and procedures of materials' testing.
4. To understand standards and references related to materials' testing.

Detailed Course Description:

Chapter No.	Chapter's Name	Chapter's Content	Duration (hrs)
1	Introduction	Concepts of forces, stresses, loading, moments, torsion, bending, deflection, and buckling.	6
2	Stress-strain relationship	Concepts of stress and strain, and the Hooke's law that controls stress - strain relationship.	4
3	Principles of statics	Including equilibrium and static equivalence.	6
4	Engineering applications	Including axial load, shear stress, combine stresses, and other applications.	6
5	Materials' testing	Methods, equipments, and procedures that concern materials' testing.	6
6	Standards and references	Including all details and requirements concerning standards and references that effect materials' testing.	4

Evaluation Strategies:

Exams		Percentage	Date
3 exams.	First exam	% 20	Week # 6
	Second exam	% 20	Week # 12
	Final exam	% 50	Week #16
research and presentation		% 10	
Total		100%	

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

Teaching Methodology:

- Lecture

Text Books & References:
Textbook:

References:

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

Engineering Program

Specialization	**CNC Machining Technology**
Course Number	**20212222**
Course Title	**Materials' Testing Lab.**
Credit Hours	**1**
Theoretical Hours	**0**
Practical Hours	**3**

Brief Course Description:

- Structural analysis of materials. Photo-electrical and thermo-electrical effects analysis. Chemical, mechanical and electrical properties of materials, strength, tensile and impact testing, hardness testing, tests for detecting cracks and flaws, ultrasonic inspection.

..

Course Objectives:

At the end of this course student will be able to:

1- perform structural analysis for materials.
2- perform destructive and non-destructive material tests.
3- study mechanical properties through performing materials' testing.
4- study chemical and physical properties of materials.
5- scan materials against cracks and defects, and performing ultrasonic inspection.

Detailed Course Description:

Chapter No.	Chapter's Name	Chapter's Content	Duration (hrs)
1	Introduction	Material testing precautions, Importance of sample preparation, writing of reports, and conclusions.	3 (1 lab)
2	Mechanical properties 1	Performing tensile, compression, bending, and impact tests. Stress-strain relationship, elongation. Sample preparation. Conclusions.	12
3	Mechanical properties 2	Performing hardness tests; Rockwell, Vickers, Brinnel. Surface roughness test. Sample preparation. Conclusions.	9
4	Chemical and physical properties	Performing material testing to study chemical and physical properties. Photo-electrical and thermo-electrical effects analysis.	9
5	Structural analysis	Performing structural and microscope tests.	9
6	X-Ray tests and Ultrasonic inspection	Performing scans against cracks and flaws.	6

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

Evaluation Strategies:

Exams		Percentage	Date
3 exams	First exam	% 20	Weak # 6
	Second exam	% 20	Weak # 12
	Final exam	% 50	Weak # 16
Reports		% 10	
Total		100%	

Teaching Methodology:

- Lecture

Text Books & References:
Textbook:

References:

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

Engineering Program

Specialization	**CNC Machining Technology**
Course Number	**20212142**
Course Title	**Turning and Milling Workshop**
Credit Hours	**2**
Theoretical Hours	**0**
Practical Hours	**6**

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

Brief Course Description:

- Introduction to conventional machining operations: turning, milling, shaping, grinding. Cutting tools: drills, turning tools, milling tools, shaping tools and sharpening tools. Work piece fixing. Grinding wheels. Examples of machining operations.

Course Objectives:

At the end of this course student will be able to:

1. setup and operate lathe machine
2. Straight & facing turning
3. Taber turning , knurling, & threading
4. setup and operate milling machine
5. milling Flat surface bevels, Grooves & keyways
6. Drilling & boring and chamfers
7. Dividing & indexing on milling machine
8. setup and operate shaping machine
9. Plaining Flat surface bevels, Grooves & keyways
10. grinding drills & turning tools

Detailed Course Description:

Lab Number	Lab Name	Lab Content	Time Needed
1.	Turning	**The student should practicing on :** ▪ Mantling and dismantling [chucks (three, 4- jaw, collets , spindle, step), tailstock] ▪ Centering work piece in the chucks and between centers, face plate. ▪ Install cutting tools ▪ Operate the machine ▪ External & internal turning process ~ Straight turning & facing ~boring ~Taber turning ~Threading ~knurling	
	Milling	**The student should practicing on :** ▪ Mantling and dismantling **(** cutter arbor, machine vice, vertical head, dividing –head,) ▪ Install cutting tools with arbors, holders, adapters ▪ Operate the machine heads & movements ▪ Install work-piece with vises& holding devices ▪ Milling process ~Flat surface bevels, and chamfers ~Grooves & keyways ~Drilling & boring ~Dividing & indexing	

	Shaping & planning	**The student should practicing on :** ▪ Mantling and dismantling (machine vice **)** ▪ Install cutting tools with arbors, holders, adapters ▪ Operate the machine heads & movements ▪ Install work-piece with vises & holding devices ▪ shaping process ~Flat surface bevels, and chamfers ~Grooves & keyways	
	Grinding	**The student should practicing on :** ▪ Balancing and Mantling grinding wheels ▪ Operate the machine ▪ Grinding process ~Drills ~Lathe tools	

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**

Teaching Methodology:

- Lecture

Text Books & References:
Textbook:

References:

Engineering Program

Specialization	**CNC Machining Technology**
Course Number	**20212152**
Course Title	**CNC Machines Workshop**
Credit Hours	**2**
Theoretical Hours	**0**
Practical Hours	**6**

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

Brief Course Description:

- Setup and operating NC machine tools and machining centers. Cutting tools installing. Programming straight lines and curves. Programming simple machining operations. Installing NC part programs. Single and cycle programming. Program testing and execution. Examples.

..

Course Objectives:

At the end of this course student will be able to:

1. set up the CNC machining centers and CNC turning lathes
2. install, measure and inter data of cutting tools
3. nominate all machine parts and components
4. mantle vise and indexing devices
5. install CNC programs manual and with Pc interface
6. test and correcting CNC programs
7. operate CNC machines

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	CNC Lathe machine	**The student should practicing** ▪ setup the machine, tools mantling, installing programs, putting machine to the reference point, testing programs and operate the machine	
2.	CNC Machining Center	**The student should practicing** ▪ setup the machine, tools mantling, installing programs, putting machine to the reference point, testing programs and operate the machine	
3.	CNC wire cutting machine	**The student should practicing** ▪ setup the machine, tools mantling, installing programs, putting machine to the reference point, testing programs and operate the machine	
4.		▪	

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

Teaching Methodology:

- Lecture

Text Books & References:
Textbook:

References:

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

Engineering Program

Specialization	**CNC Machining Technology**
Course Number	**20212252**
Course Title	**Advanced Applications of CNC Machines**
Credit Hours	**3**
Theoretical Hours	**1**
Practical Hours	**6**

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

Brief Course Description:

- .. Operator monitor, dwell time, subroutine call, polygon programming, tool path correction, face turning, redrawing cycle, threading, industrial machine registry, peripheral instrument programming, PC design tutorial and NC programming, creating 2D geometry, tool path contour, chamfer, roughing and finishing passes, rotating geometry and tool path, creating drill tool paths, working in 3D geometry, facing and pocketing, creating multi-axes tool path, machining solids.

Course Objectives:

At the end of this course student will be able to:

1. write CNC programs with subroutine
2. write CNC programs with full cycle
3. write CNC programs with surface finishing
4. design 3D works
5. convert 3D designs to cam in mastercam software
6. install CNC programs with Pc interface
7. test and correcting CNC programs
8. operate CNC machines

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	CNC Lathe machine	**The student should practicing** ▪ installing cycling programs with subroutines , transfer cam program from Pc to machine, make necessary correction, testing programs and operate the machine	
2.	CNC Machining Center	**The student should practicing** ▪ installing cycling programs with subroutines , transfer cam program from Pc to machine, make necessary correction, testing programs and operate the machine	
3.	CNC wire cutting machine	**The student should practicing** ▪ installing cycling programs with subroutines , transfer cam program from Pc to machine, make necessary correction, testing programs and operate the machine	
4.	Mastercam	**The student should practicing** ▪ 3D designs, converting designs to cam, transferring cam programs to the machine.	

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 & classroom tasks

Application in workshop

Text Books & References:

Textbook:

References:

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

Engineering Program

Specialization	**CNC Machining Technology**
Course Number	**20212251**
Course Title	**Computer-Aided Manufacturing**
Credit Hours	**3**
Theoretical Hours	**3**
Practical Hours	**0**

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

Brief Course Description:

- Introduction to production and manufacturing systems. Metal removal processes. Metal removal machine tools. Machining parameters. Basic relationships and calculations. NC and CNC machine tools. Structure, types and specifications. Control resolution, accuracy and repeatability of positioning systems. Process planning. NC part programming. Instruction coding, ISO coding system. Examples of part programming.

Course Objectives:

At the end of this course student will be able to:

1. selection admissible cutting speeds
2. selection of CNC machines
3. listing G & M functions
4. writing CNC program blocks
5. writing simple CNC program

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	NUMERICAL CONTROL	▪ Introduction to principal of automation, feed back loop ▪ Numerical control principal ▪ Numerical control systems ▪ Basis for NC measurement ▪ Kinds of NC ▪ Dimensioning system used in NC programming ▪ NC programming cods ▪ NC language ▪ NC program writing structure	
2.	NC cutting parameters	▪ Introduction to cutting parameters ▪ Calculation of cutting speed ▪ Calculation of feed	
3.	CNC programming	▪ Introduction to CNC (What is CNC, Main elements, Program Processing, Advantages) ▪ Basic of program (introduce. , system of axes, coordinate system . Absolute & incremental systems, Concept of programming, Block format) ▪ G & M codes , S,F – Functions ▪ Machine Datum & reference Points ▪ Programming using single operation function ▪ Programming using cycle operation function ▪ Operation and NC viewer	

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. Metalwork Technology and practice, Victor E. Repp, USA

References:

1. CNC 800T programming manual
2. MTC software CNC turning
3. EMCO technics, programming instr. Emcotronic T2

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

Engineering Program

Specialization	**CNC Machining Technology**
Course Number	**20212151**
Course Title	**Computer Aided Design and Programming**
Credit Hours	**2**
Theoretical Hours	**0**
Practical Hours	**6**

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

Brief Course Description:

- Introduction to numerical control NC and CNC systems. Structure of NC and CNC systems, applications of NC systems, types of NC systems, NC part programming. Programming languages. G-M-Codes and functions. Key issues of NC programming. Programming modes, tool path, units, tool programming, zero set. Compensations, machine setup. NC part program introducing. Interpolation. Program test (simulation mode) and machining mode...

Course Objectives:

At the end of this course student will be able to:

1. write CNC program in simple and cycle functions
2. setup the CNC machine to work
3. install CNC program in the machine
4. test CNC program

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	**NUMERICAL CONTROL**	**The student should practicing on**: ▪ differences between NC and conventional machines, safety rules and emergences	
2.	**CNC programming**	**The student should practicing on the writing CNC programs of different types of functions** ▪ Programming using single operation function ▪ Programming using cycle operation function ▪ Tool compensation ▪ Operation and NC viewer	
3.	**Program installation**	▪ **The student should practicing on the machine monitor CNC programs installation**	
4.	**Program Testing**	**The student should practicing on** ▪ **Machine setup** ▪ **Dry run CNC programs**	

❖ **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 & classroom tasks
Application in workshop

Text Books & References:
Textbook:

2. Metalwork Technology and practice, Victor E. Repp, USA

References:

4. CNC 800T programming manual
5. MTC software CNC turning
6. EMCO technics, programming instr. Emcotronic T2

Engineering Program

Specialization	**CNC Machining Technology**
Course Number	**20212231**
Course Title	**Manufacturing Processes**
Credit Hours	**2**
Theoretical Hours	**2**
Practical Hours	**0**

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

Brief Course Description:

- Hot and cold working of metals, elastic deformation, rolling, forging, extrusion, drawing, pipe and tube manufacturing, casting, molding, and foundry processes. Metal cutting methods, turning, drilling, milling, sawing, planning. Machining cutters and machining operations.

Course Objectives:

This course is designed to introduce student in manufacturing process specialization to the basic process, hot and cold working of metal like:
Plastic deformation; Rolling; Forging; Extrusion; Drawing and Foundry processes.

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	**Rolling of metals**	▪ Introduction, the flat – Rolling process, flat rolling practice, rolling mills, various rolling processes, rolling defects and mills	
2.	**Forging metals**	▪ Introduction, Open – Die forging, impression –die and closed – die forging, various forging operation, forge ability of metals, forging defects, forging machines	
3.	**Extrusion and Drawing of metals**	▪ Introduction, the extrusion process, hot extrusion, cold extrusion. Extrusion defects, extrusion equipment. The drawing process, drawing practice, drawing defects, drawing equipment	
4.	**Sheet – Metal Forming Processes**	▪ Shearing, sheet metal characteristics and form ability, bending sheets, plates, and tubes	
5.	**Foundry Tools and Equipment**	▪ moulding boxes, moulding machines, moulding and core making, moulding materials (sand, binds, additives), Properties of moulding sand, types of moulding sand, testing moulding sand, moulding processes, green sand moulding, gates and risers, types of gates, patterns, cores	
6.	**Casting methods**	▪ permanent moulding casting, semi – permanent moulding casting, die casting centrifugal casting, shell moulding process, casting defects, cleaning of casting, inspection of casting	

Evaluation Strategies:

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

Teaching Methodology:

- ❖ Lecture

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 Wilely and sons.
2. Production Technology last edition,HMT Bangalore,Taate Mc Graw – Hill Publishing Company.

Specialization	**CNC Machining Technology**
Course Number	20212232
Course Title	**Manufacturing Processes Workshop**
Credit Hours	**1**
Theoretical Hours	**0**
Practical Hours	**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:

After presenting in this course the student should:

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

Detailed Course Description:

Lab Number	Lab Name	Lab Content	Time Needed
1.	**Metal sheet forming**	▪ Bending ▪ Rolling ▪ Shearing ▪ Blanking and Pressing ▪ Visits to metal Forming Plants ▪ Sand casting ▪ Preparing of sand ▪ Preparing mould ▪ Casting of non ferrous metals ▪ Visit to casting plants	

Evaluation Strategies:

Exams		Percentage	Date
Exams	Assignments	30%	--/--/----
	Mid-tern exam	20%	--/--/----
	Final practical exam	50%	--/--/----
Homework and Projects			
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 Wilely and sons.
2. Production Technology last edition, HMT Bangalore. Taate Mc Graw – Hill Publishing Company.

Specialization	**CNC Machining Technology**
Course Number	
Course Title	**Nontraditional Machining**
Credit Hours	**3**
Theoretical Hours	**1**
Practical Hours	**6**

Brief Course Description:

- Introduction to advanced manufacturing machines, EDM, EDB, ECM, WCM, USM where is no Sharpe tools needed, classification, specification, components and process diagram, operation of those machines, electrodes

Course Objectives:

At the end of this course student will be able to:

1. tell specifications, components, and operation diagram for each machine
2. select and setup electrodes
3. setup and operate EDM, EDB, ECM, WCM, and USM

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	**Introduction to Nontraditional machining**	▪ Definitions, industrial standards, Importance, nontraditional industrial process, safety rules	
2.	**EDM, EDB Machine**	▪ E D machines types ▪ E D machines parts ▪ Movement drives methods ▪ Electrodes and their usage ▪ Cutting operation and machine diagram **The student should practicing** ▪ writing & installing programs with subroutines including drilling with dwell time, redrawing cycle, path correction, threading, chamfer, and automatic chuck & tail stock	
3.	**WCM Machine**	▪ machines types ▪ machines parts ▪ Movement drives methods ▪ Electrodes and their usage ▪ Cutting operation and machine diagram [**The student should practicing** ▪ writing & installing programs with subroutines including drilling, slotting , and safety devices	
4.	**ECM, and USM**	▪ machines types ▪ machines parts ▪ Movement drives methods ▪ Electrodes and their usage ▪ Cutting operation and machine diagram	

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

Teaching Methodology:

- Lecture & classroom tasks

Application in workshop

Text Books & References:

Textbook:

3. Metalwork Technology and practice, Victor E. Repp, USA

References:

1. CNC 800T programming manual
2. MTC software CNC turning
3. ACM, programming. Taiwan