



A) COURSE

Course Id:	Course
5626	Fabrication Processes III

Class Hours per Week	Lab hours per week	Complementary practices	Credits	Total hour course
3	2	3	8	48 h Theory 32 h Lab 80 h Total

B) GENERAL COURSE INFORMATION:

	EE (IEA)	ME (IM)	MME (IMA)	EME (IME)	MTE (IMT)
Level:		VII	IX		
Course Type (Required/Elective)		Required	Required		
Prerequisite Course:		Manufacturing processes II	Manufacturing processes II		
CACEI Classification:		CI	CI		

C) COURSE OBJECTIVE

At the end of the course, the student will be capable of:

Apply the Knowledge in the chip release in machining, including the tool machines and the cut machines, to determine the incidence of the mechanical phenomena such as tool machine, cut machine, subjection device.

D) TOPICS (CONTENTS AND METHODOLOGY)

1. - Machining with geometrically well-defined tool edges.		4 Hours
Specific Objective:	The student will implement the basic concepts of machining with geometrically well-defined tool edges.	
	1.1 Introduction. 1.2 Tools. Concepts and designations. 1.3 Machining. 1.4 Loads and stresses over the turning tool. 1.5 Wearing. 1.5.1 Wearing forms and measuring parameters. 1.5.2 Wearing causes.	
Readings and other resources	Books, articles, extra references, Internet.	
Teaching Methodologies	Class exposition, exposed concepts analysis, solving exercises, collaborative work, problem based Knowledge, project based Knowledge, brainstorming, forums, round table debates.	



Learning Activities	Team work dynamics, homework assignment and their discussion, problem solving, debates, posters, conceptual maps, investigation, summaries, infographics, synoptic squaring.
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2. - Tools.		3 Hours
Specific Objective:	The student will implement basic tools used in the chip release machining.	
<p>2.1 Cutting materials.</p> <p style="margin-left: 20px;">2.1.1 Synopsis about cutting materials.</p> <p style="margin-left: 20px;">2.1.2 Steel for tools.</p> <p style="margin-left: 20px;">2.1.3 Steel for fast Works or high speed.</p> <p style="margin-left: 20px;">2.1.5 Hard metals.</p> <p style="margin-left: 20px;">2.1.6 Ceramic for cutting.</p> <p style="margin-left: 20px;">2.1.7 Diamond as cutting material.</p> <p style="margin-left: 20px;">2.1.8 cubic crystalline boron nitrate (CbN)</p> <p>2.2 Ways to construct tools.</p> <p style="margin-left: 20px;">2.2.1 Solid Steel tools.</p> <p style="margin-left: 20px;">2.2.2 Welded joint cut tools.</p> <p style="margin-left: 20px;">2.2.3 Insert tools con insertos de corte sujetos.</p> <p style="margin-left: 20px;">2.2.4 Special construction types.</p> <p>2.3 Tools preparation.</p>		
Readings and other resources	Books, articles, extra references, Internet, normative.	
Teaching Methodologies	Class exposition, exposed concepts analysis, solving exercises, collaborative work, problem based Knowledge, project based Knowledge, brainstorming, forums, round table debates.	
Learning Activities	Team work dynamics, homework assignment and their discussion, problem solving, debates, posters, conceptual maps, investigation, summaries, infographics, synoptic squaring.	

3. - Lubricant and cooling materials.		3 Hours
Specific Objective:	The student will understand the lubricant influence in the cutting processes by the chip release machining.	
<p>3.1 task of cooling and lubricant materials.</p> <p>3.2 effects of the cooling lubrication on the chip release process.</p> <p style="margin-left: 20px;">3.3 selection of the cooling and lubricant material.</p>		
Readings and other resources	Books, articles, extra references, Internet, normative.	
Teaching Methodologies	Class exposition, exposed concepts analysis, solving exercises, collaborative work, problem based Knowledge, project based Knowledge, brainstorming, forums, round table debates.	
Learning Activities	Team work dynamics, homework assignment and their discussion, problem solving, debates, posters, conceptual maps, investigation, summaries, infographics, synoptic squaring.	

4. – Cut ability or chip ability.		4 Hours
Specific Objective:	The student will apply the cut ability basic concepts.	



4.1 Cut ability or chip ability concept. 4.2 Chip ability test. 4.2.1 Evaluation value: duration or life. 4.2.2 Evaluation value: cutting force. 4.2.3 Evaluation value: surface. 4.3 Different materials chip ability of different materials and under diverse conditions.	
Readings and other resources	Books, articles, extra references, Internet, normative.
Teaching Methodologies	Class exposition, exposed concepts analysis, solving exercises, collaborative work, problem based Knowledge, project based Knowledge, brainstorming, forums, round table debates.
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5. - Settling the cheapest cutting conditions.		2 Hours
Specific Objective:	The student will implement the most favorable parameters for the cutting process.	
5.1 Optimization of the cutting values. 5.2 Limits for the cutting values. 5.3 Determination and optimization of the cutting values.		
Readings and other resources	Books, articles, extra references, Internet, normative.	
Teaching Methodologies	Class exposition, exposed concepts analysis, solving exercises, collaborative work, problem based Knowledge, project based Knowledge, brainstorming, forums, round table debates.	
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6. - Processes with rotating main movement.		6 Hours
Specific Objective:	The student will understand the chip release cutting process with geometrical defined edges for rotating main movement processes.	
6.1 Turning 6.1.1 General concepts. 6.1.2 Process Variants, specific characteristics and tools. 6.2 Milling 6.2.1 General concepts. 6.2.2 Process Variants, specific characteristics and tools. 6.3 Drilling. 6.3.1 Generalities. 6.3.2 Process Variants, specific characteristics and tools. 6.3.4 Rhymed. 6.4 Sawing. 6.4.1 Generalities. 6.4.2 Process Variants, specific characteristics and tools.		
Readings and other resources	Books, articles, extra references, Internet, normative.	
Teaching Methodologies	Class exposition, exposed concepts analysis, solving exercises, collaborative work, problem based Knowledge, project based Knowledge, brainstorming, forums, round table debates.	



Learning Activities	Team work dynamics, homework assignment and their discussion, problem solving, debates, posters, conceptual maps, investigation, summaries, infographics, synoptic squaring.
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7. - Processes with lineal main movement.		4 Hours
Specific Objective:	The student will understand the chip release cutting process with geometrical defined edges for lineal main movement processes.	
7.1 Brochado 7.1.1 General concepts 7.1.2 Process Variants, Specific characteristics and tools		
7.2 Cepillado and amortajado 7.2.1 General concepts 7.2.2 Process Variants, Specific characteristics and tools. 7.2.3 Tallado de Gear 7.2.4 Peinado de Gear		
Readings and other resources	Books, articles, extra references, Internet, normative.	
Teaching Methodologies	Class exposition, exposed concepts analysis, solving exercises, collaborative work, problem based Knowledge, project based Knowledge, brainstorming, forums, round table debates.	
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8. - Fundaments about the chip release with geometrically indefinite edge.		4 Hours
Specific Objective:	The student will understand the basic concept of the cutting process with geometrically undefined edges of chip release.	
8.1 Medium form of the indeterminate edge. 8.2 Operation principle for the edge contact. 8.3 Edge contact. 8.4 Cutting strength and energy distribution in the grain edge. 8.5 Wearing.		
Readings and other resources	Books, articles, extra references, Internet, normative.	
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9. - Tools.		3 Hours
Specific Objective:	The student will implement the basic tools used in the material removal process.	



9.1 Abrasive material. 9.1.1 Natural abrasive grains. 9.1.2 Synthetic abrasive grains. 9.2 Binders. 9.2.1 Inorganic binders. 9.2.1 Organic binders. 9.3 Tool design and construction. 9.3.1 Tools made from abrasive bind material. 9.3.2 Diamond and cubic boron nitrate abrasive bodies. 9.3.3 Abrasive tools over supported material. 9.3.4 Not agglutinated abrasive material. 9.4 Tools preparation. 9.4.1 Tools and processes to prepare the agglutinant grain abrasive tools. 9.4.2 Tools and processes to prepare the diamond and cubic boron nitrate abrasive tools. 9.4.3 Tools and processes to prepare the support material abrasive tools.	
Readings and other resources	Books, articles, extra references, Internet, normative.
Teaching Methodologies	Class exposition, exposed concepts analysis, solving exercises, collaborative work, problem based Knowledge, project based Knowledge, brainstorming, forums, round table debates.
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10.- Cooling		Hours
Specific Objective:	The student will understand the influence of the cooling materials in the chip release cutting processes.	
10.1 Classification and properties of the cooling materials. 10.2 Additives for the cooling materials. 10.3 Test on cooling materials. 10.4 Cleaning and removal of cooling materials.		
Readings and other resources	Books, articles, extra references, Internet, normative.	
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11. - Selection criteria for the fine-defined process.		1 Hours
Specific Objective:	The student will compare the principal selection criteria for the fine-defined process.	
11.1 Selection criteria for the well-defined process.		
Readings and other resources	Books, articles, extra references, Internet, normative.	
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12. - Rectification of the disc.		4 Hours
Specific Objective:	The student will interpret the basic conditions for the disc rectification process.	
12.1 Kinematic fundamentals. 12.2 Specific kinematic of the process. 12.3 Characteristic parameters and results as entrance parameters function. 12.4 Influence of the interference parameters. 12.5 Influence of the chemical composition of the abrasive disc 12.6 Selection of the optimal parameters during the process. 12.7 Possibilities of the process realization. 12.8 Rectification without points. 12.9 Rectification of the gear.		
Readings and other resources	Books, articles, extra references, Internet, normative.	
Teaching Methodologies	Class exposition, exposed concepts analysis, solving exercises, collaborative work, problem based Knowledge, project based Knowledge, brainstorming, forums, round table debates.	
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13.- Rectification with an abrasive band.		1 Hour
Specific objective:	The student will interpret the basic conditions for the rectification process with an abrasive band.	
13.1 Rectification with abrasive band.		
Readings and other resources	Books, articles, extra references, Internet, normative.	
Teaching Methodologies	Class exposition, exposed concepts analysis, solving exercises, collaborative work, problem based Knowledge, project based Knowledge, brainstorming, forums, round table debates.	
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14.- Burnished (Honing)		2 Hours
Specific objective:	The student will interpret the basic conditions for the rectification process with a grinding wheel.	
14.1 Kinematic fundamentals. 14.2 Influence of the entrance parameters and working results as contact parameter function. 14.3 Characteristic parameters and working results as tool function. 14.4 Characteristic parameters and working results as raw piece quality function. 14.5 Characteristic parameters and working results as auxiliary material function. 14.6 Plain burnished.		
Readings and other resources	Books, articles, extra references, Internet, normative.	
Teaching Methodologies	Class exposition, exposed concepts analysis, solving exercises, collaborative work, problem based Knowledge, project based Knowledge, brainstorming, forums, round table debates.	
Learning Activities	Team work dynamics, homework assignment and their discussion, problem solving, debates, posters, conceptual maps, investigation, summaries, infographics, synoptic squaring.	

15.- Lapping		2 Hours
Specific objective:	The student will interpret the basic conditions for the willing process with abrasive paste.	



15.1 General concepts. 15.2 Application range. 15.3 Lapping process. 15.4 Division of the lapping processes. 15.5 Plain lapping. 15.6 Other lapping processes.	
Readings and other resources	Books, articles, extra references, Internet, normative.
Teaching Methodologies	Class exposition, exposed concepts analysis, solving exercises, collaborative work, problem based Knowledge, project based Knowledge, brainstorming, forums, round table debates.
Learning Activities	Team work dynamics, homework assignment and their discussion, problem solving, debates, posters, conceptual maps, investigation, summaries, infographics, synoptic squaring.

16. - Special cutting processes.		4 Hours
Specific objective:	The students will classify the basic concepts of the most specialized cutting processes used in the industry	
16.1 Thermal eroded. 16.1.1 Thermal eroded by adding heat. 16.1.2 Thermal erosion with sparks. 16.2 Electro erosion. 16.2.1 Electro erosion by immersion. 16.2.2 Electro erosion with wire. 16.2.3 Rectification with electro erosion. 16.3 Chemical electro erosion. 16.3.1 Thermochemical deburring. 16.4 Electrochemical erosion. 16.4.1 Electrochemical shape erosion. 16.4.2 Electrochemical surface erosion. 16.4.3 Electrochemical attack. 16.5 Electron beam cutting. 16.6 Laser beam cutting. 16.7 Water-jet cutting. 16.8 Plasma cutting.		
Readings and other resources	Books, articles, extra references, Internet, normative.	
Teaching Methodologies	Class exposition, exposed concepts analysis, solving exercises, collaborative work, problem based Knowledge, project based Knowledge, brainstorming, forums, round table debates.	
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E) TEACHING AND LEARNING METHODOLOGIES

- a) Each topic conventional exposition from the teacher, using materials such as blackboard.
- b) Exposed concepts analysis.
- c) Solving exercises.
- d) Robotics integrative practical team work (CNC, PLC Y CIH)
- e) Homework, discussion about them, in order to stimulate the collaborative work among students.
- f) Test application.



F) EVALUATION CRITERIA:

Evaluation:	Schedule	Suggested Form of Evaluation and weighing	Topics
1st. Partial evaluation	Session 16	33 % total weighing Partial evaluation: Exam 80% , homework 20%	1,2,3,4 and 5
2nd. Partial evaluation	Session 32	33 % total weighing Partial evaluation: Exam 80% , homework 20%	6,7,8, and 9
3rd. Partial evaluation	Session 48	33 % total weighing Partial evaluation: Exam 80% , homework 20%	10,11,12,13,14,15 and 16
Final Evaluation		100% (partial evaluation average)	
Other activity:	Includes Lab: Machines and tools with special activities in the corresponding instructive manual.		
Extraordinaire exam	Week 17 of the semester	100% Exam	100% content
Title Exam	According to the Scholar board program.	100% Exam	100% content
Regularization exam	According to the Scholar board program.	100% Exam	100% content

G) BIBLIOGRAPHY AND ELECTRONIC RESOURCES

Main Books

Procesos de manufactura.
 John A. Schey.
 Editorial McGraw-Hill. 2001.

Principio de ingeniería de manufactura.
 Vic Chiles, Stewart C. Black; A. J. Lissaman and S. J. Martin.
 Grupo Editorial Patria. 2002.

PRÁCTICAS Y PROCESOS DE TALLER DE MECANIZADO - Fabricación por arranque de viruta
 MALLORQUÍN, Salvador; CARRASCO, José
 Editorial: Alfaomega, Marcombo
 Año de edición: 2014

Complementary Books

- Procesos de manufactura versión SI.
 Myron I. Begeman
 Editorial Cecsa, 13ª. Reimpresión 1998.
- Fundamentos de manufactura moderna. (materiales, procesos y sistemas).
 Mikell p. Groover.
 Editorial Prentice Hall 9a. edición. 2007.



- Manual de Ingeniero Mecánico.
Dubbel. W. Beitz, K. H. Küttner.
Editorial Springer-Verlang

Catalogs:

- León Well, S.A. de C.V.,
- Kennametal Inc,
- Mitutoyo Mexicana S.A. de C.V.
- Serviacero Especiales S.A. de C.V.
- Sandvik Coromant, productos para el mecanizado del metal
- Dort, fabricación de piezas por medio de metalurgia de polvos.

database

- EBSCO, Academic Search
- ScienceDirect (Elsevier)

Internet Links

- **Calculadora de velocidades de corte y avance:**
http://www.pferd.com/la-es/101_ESS_HTML.ht