

PONTIFICIA UNIVERSIDAD CATÓLICA DE CHILE
COLLEGE OF ENGINEERING
DEPARTMENT OF MECHANICAL AND METALLURGICAL ENGINEERING
ABET COURSE SYLLABI

ICM 2503 MANUFACTURING PROCESSES

Credits and contact hours:	10 UC credits / 10 hours (3 hours in lectures and 7 individual work hours per week)
Instructor's name:	Jorge Ramos Grez
Course coordinator's name	To be defined
Textbook:	Class notes (course website) LARBURU NICOLAS, Prontuario de Máquinas Herramientas, Paraninfo S.A., Madrid, España, 1991. Kalpakjian, Serope, Manufacturing engineering and technology, Third edition, Addison-Wesley, 1995
Course Catalog Description:	This course provides students with the tools to select the appropriate machining process and equipment for manufacturing a part. To choose the equipment and machining parameters for each manufacture operation. To program CNC machining process. To verify quality of completed parts.
Prerequisite Courses:	220 Cr, ING1024 Properties and Strenght of materials, ICM 2313 Graphical Design.
Co-requisite Courses:	None
Status in the Curriculum:	Required
Course Learning Outcomes:	<ol style="list-style-type: none">1. To identify machining processes and to select the appropriate equipment for manufacturing a part.2. To verify dimensional and surface quality of parts using metrology instruments.3. To choose the equipment and machining parameters for each manufacture operation.4. To program CNC machining process, manually and using CAD/CAM tools.5. To know the necessary elements to design a modern manufacturing facility.
Relation of Course to ABET Criteria:	<ol style="list-style-type: none">b. Design and conduct experiments: analyze and interpret datac. Design a system, component, or processe. Identify, formulate, and solve engineering problemsf. Professional and ethical responsibilityj. Knowledge of contemporary issues

Topics covered:

I. Basic dimensional metrology elements

1.1. Classification and practical use of metrology instruments.

1.1.1. Caliper

1.1.2. Micrometer screw gauge

1.1.3. Goniometer

1.1.4. Dial indicator

1.2 Fits and tolerances.

1.2.1. Single shaft concept

1.2.2. Single hole concept

1.2.3. Clearance fit and Interference in two pieces machining.

II. Fundamentals of metal cutting and machine-tools

2.1. Shearing manufacturing

2.1.1. Sheet-metal forming, Extrusion, Drawing, Sintering, Stamping, Casting, Forging and Bending

2.2. Metal-removing manufacturing

2.2.1. Lathes, Drilling, Reaming, Mandrelling, Filing, Brushing, Milling, sawing, grinding, burnishing, electroerosion, wire cutting, water jet cutting.

2.3. Cutting tools, life expectancy and wear.

2.3.1. Materials and terminology of cutting tools.

2.3.2. Cutting fluids and metal chip removing

2.3.3. Wear and life expectancy of the tool

2.3.4. Life expectancy and replacement criteria of a cutting tool.

2.4. Machining operations, surface roughness and data selection.

2.4.1. Machining conditions, cutting speed, feed rate, depth of cut, power, etc.

2.4.2. Multi/blade and single blade machining conditions.

2.4.3. Lathe and milling machine practical operation

III. Computer Numerical Control (CNC) machine-tools

3.1. Manual programming of ISO code (G) for part mechanizing in CNC machines.

3.1.1. Language structure and preparatory code

3.1.2. Examples of programming in CNC lathe with FANUC control

3.1.3. Examples of programming in mechanized center CNC Siemens

3.2. Programming ISO (G) code using CAD-CAM systems to mechanize a part.

3.2.1. CAM software for ISO (G) code generation (CAD-CAM practice of a 3D model part)

IV. Design of modern manufacturing facilities.

4.1. Definition of type of manufacture

4.2. Definition of manufacturing methodology

4.3. Definition of strategic systems of production and manufacturing.

4.4. Definition of process control and quality systems.