



The University of Southern Queensland

## Course Specification

### Description: Manufacturing Processes

Subject	Cat-Nbr	Class	Term	Mode	Units	Campus
MEC	2202	10565	1, 2002	EXT	1.00	TWMBA

<b>Academic Group:</b>	FOENS
<b>Academic Org:</b>	FOES02
<b>HECS Band:</b>	2
<b>ASCED Code:</b>	030101

### STAFFING

Examiner: Harry Ku  
Moderator: Mick Morgan

### PRE-REQUISITES

Pre-requisite: MEC 1201

### SYNOPSIS

Manufacturing involves the transformation of raw materials from their initial form into finished, functional products. Man achieves this transformation by numerous methods utilising a variety of processes each designed to perform a specific function in the transformation process. Inherent in the design and operation of processes must be a knowledge of the properties of engineering materials and specific methods to utilise these properties during the various stages of the manufacturing process. Because of the competitive nature of the manufacturing industry, engineers are constantly striving to create new materials, better transformation methods and processes which are cheap to operate, efficient, fast and accurate. Small batch production predominates in Australia and manufacturing methods and processes best suited for this type of production have to be designed and installed to achieve the greatest possible productivity. This course provides an introductory study of manufacturing processes and is complemented by further studies at higher levels of the program. Various material forming and cutting processes are considered, and theoretical knowledge is reinforced by practical demonstrations and videos.

### OBJECTIVES

A student who successfully completes this course will be able to:

- explain the principles associated with basic operations involving the forming, machining and welding of engineering materials;
- indicate the advantages and limitations of each process and its influence on the properties of the material in the finished component;

- describe the basic processes used in performing forming, machining and welding operations on engineering materials;
- outline the practical applications of a variety of forming and machining processes;
- analyse the costs of various manufacturing processes in terms of fixed and variable costs and break even point;
- apply practical design methods to materials working techniques;
- explain the geometry of tooling used on various metal cutting machines;
- describe the effect of heat, lubrication and various cutting tool materials on the metal cutting process;
- write 2.5-D programmes for computer numerical controlled machines.

## TOPICS

Description	Weighting (%)
1. FORMING OPERATIONS	0.00
2. Manufacturing Costs . Fixed and variable costs, break even point, process comparison.	5.00
3. Casting Processes . Metal behaviour, sand casting, shell moulding, full mould process, die casting, centrifugal casting, investment casting. Casting Alloys. Design for casting. Casting defects. Process comparison.	12.00
4. Working Processes . Hot and cold working processes, rolling, forging, extrusion, drawing, pressing, deep drawing. Characteristics defects in wrought products.	18.00
5. Powder Metallurgy . Metal and ceramic powders, pressing, sintering, product types, product characteristics.	5.00
6. Processing of Polymers, Ceramics and Composites . Injection moulding, compression moulding, blow moulding, extrusion, calendaring, forming of clay products, jiggering, slip casting, dry pressing, drying, firing, filament winding, pultrusion, lamination, autoclave curing, braiding.	5.00
7. Welding Processes . Fusion welding, pressure welding.	8.00
8. Jigs and Fixtures . Principles of location, principles of jigs and fixtures design. Drill jigs, milling fixtures, grinding fixtures, turning fixtures and welding fixtures. CUTTING OPERATIONS	5.00
9. Principles of Metal Cutting . Chip formation, types of chips, basic cutting angles, heat zones, tool wear, lubricants, tool materials.	7.00
10. Turning Operations . Orthogonal and oblique cutting, basic processes.	5.00
11. Introduction to Numerical Control . Basic principles, applications.	6.00
12. Milling Operations . Types of operations, types of cutters.	5.00
13. Broaching Operations . Types of broaches, broaching operations.	3.00
14. Shaping and Planing . Types of shapers and planers, basic operations.	3.00

15. Grinding Operations . Grinders, types of grinding operations.	3.00
16. Drilling Operations . Types of drills, basic operations.	3.00
17. Generation of Forms . Making of screw threads and gears.	3.00
18. Non Traditional Machining Processes . Electrodischarge machining, chemical machining.	4.00

### **TEXT and MATERIALS required to be PURCHASED or ACCESSED:**

Books can be ordered by fax or telephone. For costs and further details use the 'Book Search' facility at <http://bookshop.usq.edu.au> by entering the author or title of the text.

Kalpakjian S, Schmid, S. *Manufacturing Engineering and Technology*, 4th Edition, Prentice Hall, 2000.

### **REFERENCE MATERIALS**

Reference materials are materials that, if accessed by students, may improve their knowledge and understanding of the material in the course and enrich their learning experience.

De Garmo E P, Temple Black J and Kohser R A *Materials and Processes in Manufacturing*, 8th edition, MacMillan Publishing Co, New York, 1988.

Doyle L E et al *Manufacturing Processes and Materials for Engineers*, 3rd Edition, Prentice Hall, 1985.

Kalpakjian, S *Manufacturing Processes for Engineering Materials*, 3rd Edition, Prentice Hall, 1997.

### **STUDENT WORKLOAD REQUIREMENTS**

ACTIVITY	HOURS
Assessment	6
Directed Study	52
Examinations	3
Private Study	94

### **ASSESSMENT DETAILS**

Description	Marks Out of	Wtg(%)	Required	Due Date
ASSIGNMENT (FORMING)	200.00	20.00	Y	04 Mar 2002 (see note 1)
ASSIGNMENT (CUTTING)	200.00	20.00	Y	04 Mar 2002 (see note 2)
3 HOUR RESTRICTED EXAM	600.00	60.00	Y	END S1 (see note 3)

**NOTES:**

1. Further details about the due dates are detailed in the assessment section of the Course Specifications.
2. Further details about the due dates are detailed in the assessment section of the Course Specifications.
3. Further details about the due dates are detailed in the assessment section of the Course Specifications.

**OTHER REQUIREMENTS**

- 1 In order to successfully complete the course students must achieve at least 40% of marks in each assessment and 50% of the total possible marks for the course and at least 50% of the total marks for the examination.
- 2 A minimum standard of communication skills must be demonstrated in order for a passing grade to be achieved.
- 3 The due date for an assignment is the date by which a student must submit the assignment to the USQ. The onus is on the student to provide proof of the submit date, if requested by the Examiner.
- 4 Students must retain a copy of each item submitted for assessment. This must be produced within five days if required by the Examiner.
- 5 In accordance with University's Assignment Extension Policy (Regulation 5.6.1), the examiner of a course may grant an extension of the due date of an assignment in extenuating circumstances.
- 6 If students submit assignments after the due date without prior approval then a penalty of up to 20% of the total marks for the assignment will apply for each working day late.
- 7 In the event that a due date for an assignment falls on a local public holiday in their area, such as a Show holiday, the due date for the assignment will be the next day. Students are to note on the assignment cover the date of the public holiday for the Examiner's convenience.
- 8 The Faculty of Engineering and Surveying will NOT accept submission of hand written or typed assignments by facsimile, e- mail or computer diskette. Students in remote locations who do not have regular access to postal services may be given special consideration.
- 9 The final grades for students will be assigned on the basis of the aggregate of the marks obtained for each of the assessments in the course.
- 10 In the restricted examination, Forming will form Part A of the questions and Cutting will form Part B. Students have to attempt a total of five (5) questions. There will be four (4) questions in each part and students will be requested to attempt at least two (2) questions from each part.
- 11 In the restricted examination a hand held battery operated calculator which does not have keys for the alphabet is permitted in the examination.
- 12 Students must note the make and model of the calculator used on the front of the Answer Book or Examination Paper where applicable. This may be subject to checking by the supervisor.
- 13 The Faculty of Engineering and Surveying does not offer supplementary examinations.

- 14 Students who have undertaken all of the required assessments in a course but who have failed to meet some of the specified objectives of a course within the normally prescribed time may be awarded the temporary grade: IM (Incomplete - Make up). An IM grade will only be awarded when, in the opinion of the examiner, a student will be able to achieve the remaining objectives of the course after a period of non directed personal study.
  - 15 Students who, for medical, family/personal, or employment-related reasons, are unable to complete an assignment or to sit for an examination at the scheduled time may apply to defer an assessment in a course. Such a request must be accompanied by appropriate supporting documentation. One of the following temporary grades may be awarded IDS (Incomplete - Deferred Examination; IDM (Incomplete Deferred Make-up; IDSM (Incomplete Deferred Examination and Make-up).
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