



The University of Southern Queensland

Course specification

Description: Manufacturing Processes

Subject	Cat-nbr	Class	Term	Mode	Units	Campus
MEC	2202	30501	1, 2004	EXT	1.00	TWMBA

Academic group:	FOENS
Academic org:	FOES02
Student contribution band:	2
ASCED code:	030101

STAFFING

Examiner: Harry Ku
Moderator: Bob Fulcher

REQUISITES

Pre-requisite: MEC1201

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

On completion of this course, students should be able to:

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

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

TOPICS

Description	Weighting (%)
1. Manufacturing Costs	5.00
1.1. Fixed and variable costs, break even point, process comparison.	
2. Casting Processes	12.00
2.1. Metal behaviour, sand casting, shell moulding, full mould process, die casting, centrifugal casting, investment casting. Casting Alloys. Design for casting. Casting defects. Process comparison.	
3. Working Processes	18.00
3.1. Hot and cold working processes, rolling, forging, extrusion, drawing, pressing, deep drawing. Characteristics defects in wrought products.	
4. Powder Metallurgy	5.00
4.1. Metal and ceramic powders, pressing, sintering, product types, product characteristics.	
5. Processing of Polymers, Ceramics and Composites .	5.00
5.1. 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.	
6. Welding Processes	8.00
6.1. Fusion welding, pressure welding.	

7.	Jigs and Fixtures	5.00
	7.1. Principles of location, principles of jigs and fixtures design. Drill jigs, milling fixtures, grinding fixtures, turning fixtures and welding fixtures.	
8.	Principles of Metal Cutting	7.00
	8.1. Chip formation, types of chips, basic cutting angles, heat zones, tool wear, lubricants, tool materials.	
9.	Turning Operations	5.00
	9.1. Orthogonal and oblique cutting, basic processes.	
10.	Introduction to Numerical Control	6.00
	10.1. Basic principles, applications.	
11.	Milling Operations	5.00
	11.1. Types of operations, types of cutters.	
12.	Broaching Operations	3.00
	12.1. Types of broaches, broaching operations.	
13.	Shaping and Planing	3.00
	13.1. Types of shapers and planers, basic operations.	
14.	Grinding Operations	3.00
	14.1. Grinders, types of grinding operations.	
15.	Drilling Operations	3.00
	15.1. Types of drills, basic operations.	
16.	Generation of Forms	3.00
	16.1. Making of screw threads and gears.	
17.	Non Traditional Machining Processes	4.00
	17.1. Electrodischarge machining, chemical machining.	

TEXT and MATERIALS required to be PURCHASED or ACCESSED:

ALL textbooks and materials are available for purchase from USQ BOOKSHOP (unless otherwise stated). Orders may be placed via secure internet, free fax 1800642453, phone 07 46312742 (within Australia), or mail. Overseas students should fax +61 7 46311743, or phone +61 7 46312742. For costs, further details, and internet ordering, use the 'Textbook Search' facility at <http://bookshop.usq.edu.au> click 'Semester', then enter your 'Course Code' (no spaces).

Grooves, M. P. 2002, *Fundamentals of Modern Manufacturing: Materials, Processes and Systems*, 2nd edn, Wiley, New York.

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. & Kohser, R. A. 2002, *Materials and Processes in Manufacturing*, 9th edn, Wiley, New York.

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

Kalpakjian, S. & Schmid, S. 2000, *Manufacturing Engineering and Technology*, 4th edn, Prentice Hall, New Jersey.

STUDENT WORKLOAD REQUIREMENTS:

ACTIVITY	HOURS
Assessment	6.00
Directed Study	52.00
Examinations	3.00
Private Study	94.00

ASSESSMENT DETAILS

Description	Marks out of	Wtg(%)	Due date
ASSIGNMENT 1	150.00	15.00	27 Apr 2004
ASSIGNMENT 2	150.00	15.00	10 May 2004
3 HOUR RESTRICTED EXAMINATION	700.00	70.00	END S1 (see note 1)

NOTES:

1. Student Administration will advise students of the dates of their examinations during the semester.

IMPORTANT ASSESSMENT INFORMATION

- 1 Attendance requirements:

There are no attendance requirements for this course. However, it is the students' responsibility to study all material provided to them or required to be accessed by them to maximise their chance of meeting the objectives of the course and to be informed of course-related activities and administration.
- 2 Requirements for students to complete each assessment item satisfactorily:

To complete each of the assessment items satisfactorily, students must obtain at least 50% of the marks available (or at least a grade of C-) for each assessment item.
- 3 Penalties for late submission of required work:

If students submit assignments after the due date without prior approval then a penalty of 20% of the total marks available for the assignment will apply for each working day late.
- 4 Requirements for student to be awarded a passing grade in the course:

(a) To be assured of a passing grade, students must demonstrate, via the summative assessment items, that they have achieved the required minimum standards in relation to the objectives of the course by: (i) satisfactorily completing the examination and assignments as per 2 above; and (ii) obtaining at least 50% of the total weighted marks available for all summative assessment items.
- 5 Method used to combine assessment results to attain final grade:

The final grades for students will be assigned on the basis of the weighted aggregate of the marks (or grades) obtained for each of the summative assessment items in the course.
- 6 Examination information:

In a Restricted Examination, candidates are allowed access to specific materials during the examination. The only materials that candidates may use in the restricted examination for this course are: writing materials (non-electronic and free from material which could give the student an unfair advantage in the examination); calculators which cannot hold textual information (students must indicate on their examination paper the make and model of any calculator(s) they use during the examination).
- 7 Examination period when Deferred/Supplementary examinations will be held:

Any Deferred or Supplementary examinations for this course will be held during the examination period at the end of the semester of the next offering of this course.
- 8 University Regulations:

Students should read USQ Regulations 5.1 Definitions, 5.6. Assessment, and 5.10 Academic Misconduct for further information and to avoid actions which might contravene University Regulations. These regulations can be found at the URL <http://www.usq.edu.au/corporateservices/calendar/part5.htm> or in the current USQ Handbook.

ASSESSMENT NOTES

- 1 The due date for an assignment is the date by which a student must despatch the assignment to the USQ. The onus is on the student to provide proof of the despatch date, if requested by the Examiner.
- 2 Students must retain a copy of each item submitted for assessment. This must be produced within five days if required by the Examiner.
- 3 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.
- 4 The Faculty will normally only accept assessments that have been written, typed or printed on paper-based media.
- 5 The Faculty will NOT accept submission of assignments by facsimile.
- 6 Students who do not have regular access to postal services or who are otherwise disadvantaged by these regulations may be given special consideration. They should contact the examiner of the course to negotiate such special arrangements.
- 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 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 one of the temporary grades: IM (Incomplete - Make up), IS (Incomplete - Supplementary Examination) or ISM (Incomplete -Supplementary Examination and Make up). A temporary 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.
- 9 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); IDB (Incomplete - Both Deferred Examination and Deferred Make-up).