DESCRIPTION: Manufacturing Processes

<table>
<thead>
<tr>
<th>Subject</th>
<th>Cat-Nbr</th>
<th>Class</th>
<th>Term</th>
<th>Mode</th>
<th>Units</th>
<th>Campus</th>
</tr>
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<tr>
<td>MEC</td>
<td>2202</td>
<td>20566</td>
<td>1, 2003</td>
<td>EXT</td>
<td>1.00</td>
<td>TW MBA</td>
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Academic Group: FOENS
Academic Org: FOES02
HECS Band: 2
ASCED Code: 030101

STAFFING
Examiner: Harry Ku
Moderator: Bob Fulcher

PRE-REQUISITES
Pre-requisite: MEC1201

OTHER-REQUISITES
Prerequisites 70245

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**

<table>
<thead>
<tr>
<th>Description</th>
<th>Weighting (%)</th>
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</thead>
<tbody>
<tr>
<td>1. Manufacturing Costs</td>
<td>5.00</td>
</tr>
<tr>
<td>1.1. Fixed and variable costs, break even point, process comparison.</td>
<td></td>
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<tr>
<td>2. Casting Processes</td>
<td>12.00</td>
</tr>
<tr>
<td>3. Working Processes</td>
<td>18.00</td>
</tr>
<tr>
<td>4. Powder Metallurgy</td>
<td>5.00</td>
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<tr>
<td>4.1. Metal and ceramic powders, pressing, sintering, product types, product characteristics.</td>
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<tr>
<td>5. Processing of Polymers, Ceramics and Composites</td>
<td>5.00</td>
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<tr>
<td>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.</td>
<td></td>
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</table>
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


15. Drilling Operations 3.00

15.1. Types of drills, basic operations.

16. Generation of Forms 3.00

17. Non Traditional Machining Processes

17.1. Electrodischarge machining, chemical machining.

**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.


**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.


**STUDENT WORKLOAD REQUIREMENTS**

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>HOURS</th>
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<tbody>
<tr>
<td>Assessment</td>
<td>6</td>
</tr>
<tr>
<td>Directed Study</td>
<td>52</td>
</tr>
<tr>
<td>Examinations</td>
<td>3</td>
</tr>
<tr>
<td>Private Study</td>
<td>94</td>
</tr>
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</table>

**ASSESSMENT DETAILS**

<table>
<thead>
<tr>
<th>Description</th>
<th>Marks Out of</th>
<th>Wtg(%)</th>
<th>Required</th>
<th>Due Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASSIGNMENT 1 - FORMING</td>
<td>200.00</td>
<td>20.00</td>
<td>Y</td>
<td>21 Apr 2003</td>
</tr>
<tr>
<td>ASSIGNMENT 2 - CUTTING</td>
<td>200.00</td>
<td>20.00</td>
<td>Y</td>
<td>26 May 2003</td>
</tr>
<tr>
<td>3 HOUR RESTRICTED EXAM</td>
<td>600.00</td>
<td>60.00</td>
<td>Y</td>
<td>END S1</td>
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</table>

(see note )

**NOTES:**

- 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; and (ii) obtaining at least 50% of the total weighted marks available for all summative assessment items. (b) To be assured of receiving a passing grade a student must attempt all of the summative assessment items, achieve at least 50% in the examination, achieve an aggregated mark of at least 50% in the total marks allocated for the assignments, and at least 50% of the available weighted marks for the summative assessment items. (c) Students who do not qualify for a Passing grade may, at the discretion of the Examiner, be assigned additional work to demonstrate to the Examiner that they have achieved the required standard. It is expected that such students will have gained at least 45% of the total 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); English translation dictionaries (but not technical dictionaries). Candidates may take an appropriate non-electronic translation dictionary into the examination. This will be subject to perusal and, if it is found to contain annotations or markings that could give the candidate an unfair advantage, it may be removed from the candidate's possession until the appropriate disciplinary action is completed.
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/SECARIAT/calendar/Part5/ or in the printed version of 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 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.

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).

10 The Faculty of Engineering and Surveying does not offer supplementary
    examinations.