Description: Engineering Research Methodology

<table>
<thead>
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<th>Subject</th>
<th>Cat-Nbr</th>
<th>Class</th>
<th>Term</th>
<th>Mode</th>
<th>Units</th>
<th>Campus</th>
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<tr>
<td>ENG</td>
<td>4110</td>
<td>21352</td>
<td>1, 2003</td>
<td>WEB</td>
<td>1.00</td>
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Academic Group: FOENS
Academic Org: FOENSV
HECS Band: 2
ASCED Code: 039999

STAFFING
Examiner: John Billingsley
Moderator: Graham Baker

PRE-REQUISITES
Co-requisite: ENG4111

RATIONALE
There is an expectation that students who complete an undergraduate engineering program at Honours level would be equipped to undertake research and development work. This requires an ability to analyse and evaluate information to determine its usefulness, and to apply this information appropriately in their research. They will also be able to design and analyse experiments, be aware of ethical considerations and intellectual property issues, and be able to communicate well and write and analyse technical papers. They should be aware of the issues involved in research funding and be able to prepare a funding proposal. This course will enable students to build knowledge of the process of engineering research and the tools that are available to facilitate the conduct of that research, and to develop some basic research skills.

SYNOPSIS
The course instructs students in the principles of research to enable them to conduct research in their professional area of interest. Ethical and intellectual property issues are explored, and the students develop the ability to (critically) evaluate research literature including conference papers and journal articles in order to determine the current state of knowledge. Students are instructed how to propose and justify an appropriate research plan for a particular research problem, to choose and apply appropriate experimental design and analysis methodology, to judge the degree to which conclusions are supported by data, to judge the logical consistency of written material and evaluate the outcome of a research project in terms of useable knowledge, to design, defend and seek funding for research.
proposals, and to apply techniques for writing clear, concise and well expressed technical papers and reports.

**OBJECTIVES**

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

- use information systems effectively;
- judge the degree to which conclusions are supported by data and the logical consistency of written material, and to write a critical review of the relevant literature;
- discuss the ethical issues involved in research;
- discuss the development and protection of intellectual property;
- prepare a proposal for funding of a research project;
- choose and apply an appropriate experimental design to a particular research problem;
- perform standard statistical analyses;
- understand and apply a range of standard techniques for data acquisition and analysis;
- prepare a well written and concise research paper or report, and evaluate and critique papers written by others.

**TOPICS**

<table>
<thead>
<tr>
<th>Description</th>
<th>Weighting (%)</th>
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<tbody>
<tr>
<td>1. The nature of research in engineering.</td>
<td>10.00</td>
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<tr>
<td>2. Database searching and referencing at research level. Critical review of research literature.</td>
<td>15.00</td>
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<td>3. Research reporting and publishing. Presenting research concisely and clearly.</td>
<td>20.00</td>
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<td>4. Research ethics and the conduct of research, intellectual property.</td>
<td>10.00</td>
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<tr>
<td>5. Design and analysis of experiments, overview of data acquisition and analysis.</td>
<td>25.00</td>
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<tr>
<td>6. Development of research proposals.</td>
<td>20.00</td>
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**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.

PaceXL software package (Statistics Add-in for Microsoft Excel).
(PaceXL software package (Statistics Add-in for Microsoft Excel).)

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>
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<tr>
<td>Directed Study</td>
<td>48</td>
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<tr>
<td>Online Discussion</td>
<td>20</td>
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<tr>
<td>Groups</td>
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<tr>
<td>Private Study</td>
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ASSESSMENT DETAILS

<table>
<thead>
<tr>
<th>Description</th>
<th>Marks Out of</th>
<th>Wtg(%)</th>
<th>Required</th>
<th>Due Date</th>
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<tbody>
<tr>
<td>ASSIGNMENT 1</td>
<td>250.00</td>
<td>25.00</td>
<td>Y</td>
<td>24 Apr 2003</td>
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<td>ASSIGNMENT 2</td>
<td>250.00</td>
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<td>RESEARCH PROPOSAL</td>
<td>500.00</td>
<td>50.00</td>
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<td>04 Jul 2003</td>
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IMPORTANT ASSESSMENT INFORMATION

1 Attendance requirements:
   (i) 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 maximize their chance of meeting the objectives of the course and to be informed of course-related activities and administration. (ii) Participation in discussion groups. Topics will be circulated on WebCT or by e-mail. Contribution will be recognized in the marking of the first two assignments.

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 10% of the total marks gained by the student for the assignment will apply for each working day late.

4 Requirements for student to be awarded a passing grade in the course:
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 satisfactorily completing all summative assessment items (the examination and assignments), as stated in 2 above.

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:
There is no examination in this course.

7 Examination period when Deferred/Supplementary examinations will be held:
Not applicable.

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 In this course students may submit assignments electronically in the format specified in the assignment requirements.

5 The Faculty will NOT accept submission of assignments by facsimile.

6 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.

7 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).

OTHER REQUIREMENTS

1. Students will require access to e-mail and internet access to USQConnect for this course.