Description: Power Systems Analysis

<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>
</thead>
<tbody>
<tr>
<td>ELE</td>
<td>3807</td>
<td>62412</td>
<td>1, 2007</td>
<td>EXT</td>
<td>1.00</td>
<td>Toowoomba</td>
</tr>
</tbody>
</table>

Academic group: FOENS
Academic org: FOES04
Student contribution band: 2
ASCED code: 031301

STAFFING
Examiner: Tony Ahfock
Moderator: Ron Sharma

SYNOPSIS
Engineers designing and managing electrical power networks need to be familiar with the mathematical tools and the computer based techniques which are commonly used to analyse, operate and monitor such systems. The course deals with fault level calculation, power flow, power system stability and economic operation.

OBJECTIVES
The course objectives define the student learning outcomes for a course. The assessment item(s) that may be used to assess student achievement of an objective are shown in parenthesis. On completion of this course, students should be able to:

1. use software packages for design and analysis of electrical power networks and investigate typical case study problems (assignment 1 and exam);
2. specify the requirements of supply system facilities and operational details (assignment 1, 2 and exam);
3. develop computer based tools for specific applications in power system analysis, design and operation (assignment 2 and exam).

TOPICS

<table>
<thead>
<tr>
<th>Description</th>
<th>Weighting (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Basic concepts: Per unit quantities, single line diagrams</td>
<td>10.00</td>
</tr>
<tr>
<td>2. Circuit models for transformers, synchronous machines and transmission lines</td>
<td>20.00</td>
</tr>
<tr>
<td>3. Network analysis using the Nodal Admittance Matrix</td>
<td>10.00</td>
</tr>
<tr>
<td>4. Network analysis using the Bus Impedance Matrix</td>
<td>10.00</td>
</tr>
</tbody>
</table>
5. Power flow determination using the Gauss-Seidel and the Newton-Raphson methods 10.00
6. Fault level calculations using symmetrical components 10.00
7. Economic dispatch and unit commitment 15.00
8. Power system stability 15.00

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).


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>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment</td>
<td>30.00</td>
</tr>
<tr>
<td>Directed Study</td>
<td>87.00</td>
</tr>
<tr>
<td>Examinations</td>
<td>3.00</td>
</tr>
<tr>
<td>Private Study</td>
<td>35.00</td>
</tr>
</tbody>
</table>
### ASSESSMENT DETAILS

<table>
<thead>
<tr>
<th>Description</th>
<th>Marks out of</th>
<th>Wg(%)</th>
<th>Due date</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASSIGNMENT 1</td>
<td>200.00</td>
<td>20.00</td>
<td>23 Apr 2007</td>
</tr>
<tr>
<td>ASSIGNMENT 2</td>
<td>200.00</td>
<td>20.00</td>
<td>01 Jun 2007</td>
</tr>
<tr>
<td>3 HOUR OPEN EXAMINATION</td>
<td>600.00</td>
<td>60.00</td>
<td>END S1 (see note 1)</td>
</tr>
</tbody>
</table>

#### 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 satisfactorily complete an assessment item a student must achieve at least 50% of the marks or a grade of at least C-. Students do not have to satisfactorily complete each assessment item to be awarded a passing grade in this course. Refer to Statement 4 below for the requirements to receive a passing grade in this course.

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:**
   
   To be assured of receiving a passing grade, a student must achieve at least 45% in each of the weighted assessment items and at least 50% of the total weighted marks available for the course.

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 an Open Examination, candidates may have access to any material during the examination except the following: electronic communication devices, bulky materials, devices requiring mains power and material likely to disturb other students.

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).