



The University of Southern Queensland

Course specification

The current and official versions of the course specifications are available on the web at <http://www.usq.edu.au/coursespecification/current>.
Please consult the web for updates that may occur during the year.

Description: Power Electronics Principles and Applications

| Subject | Cat-nbr | Class | Term | Mode | Units | Campus |
|---------|---------|-------|---------|------|-------|-----------|
| ELE | 3805 | 90568 | 2, 2009 | EXT | 1.00 | Toowoomba |

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

STAFFING

Examiner: Fouad Kamel
Moderator: Tony Ahfock

REQUISITES

Pre-requisite: (ELE1502 and ELE1801) or Students must be enrolled in one of the following Programs: GCEN or GDET or METC or MEPR

SYNOPSIS

Power Electronics deals with study of semiconductor devices in the electric energy industry. The power semiconductor devices, such as the diode, thyristor, triac and power transistor, are used in power applications as switching devices. The modern electrical engineer requires a knowledge of these devices and their application in rectification, inversion, frequency conversion, dc and ac machine control, and switch-mode power supplies. Engineers need to be aware of the undesirable effects any power electronic equipment imposes on both the supply system and the load, and how these effects may be minimised.

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. compare the characteristics of common power semi-conductor devices (Assignment 1 and Exam);
2. evaluate rms and mean values of typical waveforms (Assignment 1 and Exam);
3. analyse common power electronic circuits quantitatively (Assignment 1, Assignment 2 and Exam);
4. select motor torque ratings for particular applications (Assignment 2 and Exam);
5. analyse DC adjustable speed drive systems quantitatively (Assignment 2 and Exam);
6. select AC adjustable speed motor/drive combinations to meet specified requirements (Assignment 2 and Exam);

7. design drive circuits for power electronic switches to meet required switching performance (Exam);
8. evaluate the relative benefits of snubber circuits (Exam).

TOPICS

| | Description | Weighting (%) |
|-----|--|---------------|
| 1. | Mathematical tools for power electronic circuit analysis | 5.00 |
| 2. | Characteristics of power electronic devices | 10.00 |
| 3. | DC to DC Converters | 10.00 |
| 4. | Diode Rectifiers | 10.00 |
| 5. | Line frequency fully controlled converters | 10.00 |
| 6. | Switch mode inverters | 10.00 |
| 7. | Switching DC power supplies | 10.00 |
| 8. | Overview of electrical drives systems | 5.00 |
| 9. | DC adjustable speed drives | 10.00 |
| 10. | AC adjustable speed drives | 10.00 |
| 11. | Drive circuits | 5.00 |
| 12. | Thermal protection and snubber circuits | 5.00 |

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.

IEEE Spectrum.

IEE Proceedings.

IEEE Transactions on Power Electronics.

IEEE Transactions on Industry Applications.

STUDENT WORKLOAD REQUIREMENTS

| ACTIVITY | HOURS |
|----------------|-------|
| Assessments | 30.00 |
| Directed Study | 87.00 |
| Examinations | 2.00 |
| Private Study | 36.00 |

ASSESSMENT DETAILS

| Description | Marks out of | Wtg (%) | Due date |
|-------------------------|--------------|---------|------------------------|
| ASSIGNMENT 1 | 200.00 | 20.00 | 01 Sep 2009 |
| ASSIGNMENT 2 | 200.00 | 20.00 | 06 Oct 2009 |
| 2 HOUR OPEN EXAMINATION | 600.00 | 60.00 | END S2 (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 satisfactorily complete an individual assessment item a student must achieve at least 50% of the marks or a grade of at least C-. (Depending upon the requirements in Statement 4 below, students may not have to satisfactorily complete each assessment item 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 extenuating circumstances then a penalty of 5% of the assigned mark may apply for each working day late up to a maximum of ten working days at which time a mark of zero can be recorded for that assignment.
- 4 Requirements for student to be awarded a passing grade in the course:
To be assured of receiving a passing grade in a course a student must obtain at least 50% of the total weighted marks 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 may be required to provide a copy of assignments submitted for assessment purposes. Such copies should be dispatched to the USQ within 24 hours of receipt of a request to do so.
- 3 In accordance with University Policy, the Examiner 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, 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 UConnect for this course.
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