

# 2008MEE

## Power Electronics and Electric Machines

### Semester 1 - 2006

Academic Organisation:	Griffith School of Engineering
Faculty:	Faculty of Engineering and Information Technology
Credit point value:	5
Student Contribution Band:	Band 2
Course level:	Undergraduate
Campus/Location/Learning Mode:	Nathan / On Campus / In Person
Convenor/s:	APro Junwei Lu (Nathan)
Enrolment Restrictions:	Restricted: Approval from Head of School
This document was last updated:	23 February 2006

#### **BRIEF COURSE DESCRIPTION**

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This course covers the theory and practice of power electronic devices, converters and circuits, and electrical machines and their control systems, and the design and analysis of electrical power and machine control systems. Assessment is by laboratory work, tutorials and an examination.

Incompatible: SM32032 Power Electronics and Electric Machines AND MEE2008 Power Electronics and Electric Machines

Advised Prerequisites: 1003MEE Computers and Software Engineering AND 1004MEE Digital Networks and Systems AND 1005MEE Electronic Devices, Circuits and Systems OR 1031MEE Introduction to Electronics, AND 1006MEE Network Theory and Analysis OR 1030MEE Electric Circuits, AND 1602SCE Mathematics AND 1605SCE Mathematics

## **SECTION A – TEACHING, LEARNING AND ASSESSMENT**

### **COURSE AIMS**

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The objective of this course is to develop student's engineering design and analysis skills in the area of power electronics and electric machines. The course covers the theory and practice of power electronics and electrical machines and their applications.

### **LEARNING OUTCOMES**

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This is a fundamental course for both communication and computer system majors. It provides a basic knowledge of electric machines and electronic devices, and control system.

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A professional electrical and electronic engineer needs to understand the integration of theory and practice in the product development, design and production. This course is directed at achieving and understanding and the practical implementation of all aspects of design and manufacture.

### **CONTENT, ORGANISATION AND TEACHING STRATEGIES**

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This course covers the theory and practice of power electronic devices, converters and circuits, and electrical machines and their control systems, and the design and analysis of electrical power and machine control systems. Assessment is by laboratory work, tutorials and an examination.

#### Contents:

- Introduction to Power Electronics and Electric Machines
- Magnetics and Energy Conversion
- Transformers I
- Transformers II
- Power Electronic Devices
- DC Choppers I
- DC Choppers II
- PWM Inverters
- Power Supplies
- Electric Machines I
- Electric Machines II
- Motor Drive Applications

#### Teaching Strategies:

Lectures	14 hours
Experiments (Laboratories)	20 hours
Tutorials	4 hours

### **CONTENT SUMMARY**

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Topic	Lecture Content	Tutorial/Laboratory Content	Readings
1.	Introduction to Power Electronics and Electric Machines		Textbook
2.	Magnetics and Energy Conversion	Laboratory I	Textbook and Lab notes
3.	Transformers I and Tutorial I &II	Laboratory I	Textbook and Lab notes
4.	Transformers II	Laboratory II	Textbook and Lab notes
5.	Power Electronic Devices	Laboratory II	Textbook and Lab notes
6.	DC Choppers I	Laboratory III Tutorial III	Textbook and Lab notes
7.	DC Choppers II	Laboratory III	Textbook and Lab notes
8.	PWM Inverters	Laboratory IV	Textbook and Lab notes
9.	Power Supplies	Laboratory IV Tutorial IV	Textbook and Lab notes
10.	Electric Machines I	Laboratory V	Textbook and Lab notes
11.	Electric Machines II	Laboratory V	Textbook and Lab notes
12.	Motor Drive Applications		Textbook and Lab notes
13.	Exam revision		Textbook and Lab notes

## ASSESSMENT

### Summary of Assessment

Five Laboratories and One Tutorial	40%
End of Semester Examination (1.5 hours)	60%

Item	Assessment Task	Length	Weighting	Total Marks	Relevant Learning Outcomes	Due Day and Time
1.	Laboratory report	One week	5% x5	100		Next week, 5pm
2.	Tutorial report	Two weeks	15%	100		Friday of Week 12, 5pm
3.	Examination	1.5 hrs	60%	100		See Exam time table
4.						

### Assessment Details

The assessment of this subject will be submitted as a percentage, with the percentages corresponding to the following grades (subject to Convenor/Assessment Board approval):

High Distinction:	85	-	100
Distinction:	75	-	84
Credit:	65	-	74
Pass:	50	-	64
Fail:	0	-	49

## GRADUATE SKILLS

The [Griffith Graduate Statement](#) lists the graduate skills that students should develop during their degree programs at Griffith University. Clarity of analysis and problem solving skills will be developed through the laboratory work, assignments (problem solving) and final examination. The knowledge gained by students will allow them to adapt to practical application problem solving.

Graduate Skills	Taught	Practised	Assessed
Effective communication (written)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Effective communication (oral)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Effective communication (interpersonal)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Information literacy	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Problem solving	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Critical evaluation	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Work autonomously	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Work in teams	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Creativity and innovation	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ethical behaviour in social / professional / work environments	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Responsible, effective citizenship	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

## TEACHING TEAM

Convenors *are required to* provide information about the teaching team. For courses offered at more than one campus, the following table may be copied for each campus, or columns may be added/deleted as required.

### Course Convenor

Convenor Details	Nathan
Campus Convenor	A/Prof. Junwei Lu
Email	j.lu@griffith.edu.au
Office Location	N44_-1.14
Phone	(07) 37355118

Fax	(07) 37355384
Consultation times	

### **COURSE COMMUNICATIONS**

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Face-to-face consultations, the use of email.

### **TEXTS AND SUPPORTING MATERIALS**

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P.C. Sen: Principles of Electric Machines and Power Electronics, Second Edition, John Wiley, 1997

## **SECTION B – ADDITIONAL COURSE INFORMATION**

Late submissions of report will result in a reduction in the final mark of 10% per day. Extensions to the assignment deadline will only be granted in exceptional circumstances. Students must apply in writing to the Course Convenor before the due date stating the reason why an extension has been sought.

## SECTION C – KEY UNIVERSITY INFORMATION

### ACADEMIC MISCONDUCT

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Students must conduct their studies at the University honestly, ethically and in accordance with accepted standards of academic conduct. Any form of academic conduct that is contrary to these standards is academic misconduct, for which the University may penalise a student. Specifically it is academic misconduct for a student to:

present copied, falsified or improperly obtained data as if it were the result of laboratory work, field trips or other investigatory work;

include in the student's individual work material that is the result of significant assistance from another person if that assistance was unacceptable according to the instructions or guidelines for that work;

assist another student in the presentation of that student's individual work in a way that is unacceptable according to the instructions or guidelines for that work;

cheat; (Cheating is dishonest conduct in assessment);

plagiarise (Plagiarism is knowingly presenting the work or property of another person as if it were one's own.)

Visit the University's [Policy on Academic Misconduct](#) for further details.

### KEY STUDENT-RELATED POLICIES

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All University policy documents are accessible to students via the University's Policy Library website at: [www.griffith.edu.au/policylibrary](http://www.griffith.edu.au/policylibrary). Links to key policy documents are included below for easy reference:

[Student Charter](#)

[Academic Standing, Progression and Exclusion Policy](#)

[Student Administration Policy](#)

[Policy on Student Grievances and Appeals](#)

[Assessment Policy](#)

[Examinations Timetabling Policy and Procedures](#)

[Academic Calendar](#)

[Guideline on Student E-Mail](#)

[Health and Safety Policy](#)

### UNIVERSITY SUPPORT RESOURCES

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The University provides many facilities and support services to assist students in their studies. Links to information about University support resources available to students are included below for easy reference:

[Learning Centres](#) - the University provides access to common use computing facilities for educational purposes. For details visit [www.griffith.edu.au/cuse](http://www.griffith.edu.au/cuse)

[Learning@Griffith](#) - there is a dedicated website for this course via the Learning@Griffith student portal.

[Student Services](#) facilitate student access to and success at their academic studies. Student Services includes: Careers and Employment Service; Chaplaincy; Counselling Service; Health Service; Student Equity Services (incorporating the Disabilities Service); and the Welfare Office.

[Learning Services](#) within the Division of Information Services provides learning support in three skill areas: computing skills; library skills; and academic skills. The study skills resources on the website include self-help tasks focusing on critical thinking, exam skills, note taking, preparing presentations, referencing, writing, proof reading, and time management.