



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: Electricity Supply Systems

Subject	Cat-nbr	Class	Term	Mode	Units	Campus
ELE	2704	90546	2, 2009	EXT	1.00	Toowoomba

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

STAFFING

Examiner: Gordon Hampson
Moderator: Ron Sharma

OTHER REQUISITES

Recommended prior or concurrent study: ELE3803 or ELE2702 or ELE1801

SYNOPSIS

This course introduces the principles and practical aspects of generation, transmission distribution and control of electrical energy. On successful completion of this course, the student should be able to discuss the technical, environmental and economic considerations of planning and operating different types of electrical plant (generators, transformers, circuit breakers, cables, insulators and transmission lines), as well as principles of substation layout, control, instrumentation and protection. The student should also be aware of the theoretical principles of system stability, load flow, and fault analysis of power systems using computing software tools.

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. justify the typical structure of modern electricity supply systems on the basis of economics, reliability, safety and technical constraints (assign 1; exam);
2. compare underground cables against overhead lines on the basis of environmental impact, cost, technical performance and supply reliability (assign 1; exam);
3. analyse three-phase electrical networks under abnormal conditions using engineering application software (assign 1 and 2);
4. determine, by qualitative analysis, the performance requirements of electricity supply system practical hardware (assign 1 and 2; exam);
5. analyse the impact of transformer tap-change on the voltage profile of radial feeders (exam); and
6. compare the relative strengths and weaknesses of typical protection schemes (exam).

TOPICS

Description	Weighting (%)
1. Power systems: environment and planning; economics	10.00
2. Generation, transmission and distribution systems	10.00
3. Lines, cables and distributors	10.00
4. Transformers	5.00
5. Surges; insulation co-ordination	5.00
6. Loads, scheduling and voltage control	5.00
7. High voltage testing, commissioning	5.00
8. Substations: layout; reliability; safety	10.00
9. High voltage switchgear	10.00
10. Protection schemes; protection relays	10.00
11. Fault calculations and symmetrical components	15.00
12. Supervisory control and communications co-ordination.	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).

To do course assignments students need to use a software program (see objective 3) that integrates mathematical and graphical analysis of data with word processing. Mathcad is the recommended software package for this course; however, students proficient in other software, such as Matlab or Excel, may opt to stick with that.

Ramakrishnan, G 1994, *Electricity supply systems examples*, ISEE Trust, Toowoomba.
(available from the USQ Bookshop)

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.

, , *Journal of ASEA Brown Boveri in Australia*,

(No longer held at the USQ Library, but freely available on the internet at:
<http://www.abb.com/abbreview>)

, , *Electrical world*,

IEE Proceedings on generation transmission and distribution,

(Available online via USQ Library catalogue.)

IEEE Transactions on industry applications,
(Available online via USQ Library catalogue.)

IEEE Transaction energy conversion,
(Available online via USQ Library catalogue.)

IEEE Transactions on power systems,
(Available online via USQ Library catalogue.)

Gonen, T 1988, *Modern power system analysis*, J Wiley, New York.
(international edn)

Nasar, SA 1990, *Schaum's outline of theory and problems of electric power systems*, McGraw-Hill, New York.
(USQ Library Call No. 621.31Nas.)

Nasar, SA & Trutt, FC 1999, *Electric power systems*, CRC Press, Boca Raton.
(USQ Library Call No. 621.31Nas)

Pabla, AS 2005, *Electric power distribution*, McGraw-Hill, New York.
(USQ Library Call No: 621.319 Pab)

PTD Publications Pty Ltd, Kenmore Qld 'Australasian power transmission & distribution' (Available: www.powertrans.com.au).

Rockwell Automation Asia Pacific Ltd 'Automation Today' (Available: http://www.rockwellautomation.com.au/applications/gs/AP/GSAU.nsf/pages/Current_Issue).

Standards Australia 2000, *SAA HB13 Electrical equipment for hazardous areas*, 2nd edn,
(Available from Standards On-Line Premium database via the USQ Library home page)

Strauss, C 200-?, *Practical power distribution for industry*, Electrical Engineering Book Sales Australia, IDC Technologies, West Perth.
(USQ Library Call No. 621.319 Str)

Weedy, BM & Cory, BJ 1998, *Electric power systems*, 4th edn, Wiley, Chichester, England.
(USQ Library Call No: 621.3191Wee)

Whitaker, JC 1998, *AC Power systems handbook*, 2nd edn, CRC Press, Boca Raton.
(USQ Library Call No: 621.31913Whi)

Yamayee, ZA & Bala, JL 1994, *Electromechanical energy devices and power systems*, J Wiley, New York.
(international edn)

STUDENT WORKLOAD REQUIREMENTS

ACTIVITY	HOURS
Assessments	35.00
Directed Study	68.00
Examinations	2.00
Private Study	50.00

ASSESSMENT DETAILS

Description	Marks out of	Wtg (%)	Due date
ASSIGNMENT 1	200.00	20.00	07 Sep 2009
ASSIGNMENT 2	200.00	20.00	12 Oct 2009
2 HOUR CLOSED 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:
(i) To complete each of the assignments satisfactorily, students must obtain at least 50% of the marks available (or at least a grade of C-) for each assignment. (ii) To complete the examination satisfactorily, students must obtain at least 50% of the marks available (or at least a grade of C-) for the examination.
- 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 a Closed Examination, candidates are allowed to bring only writing and drawing instruments into the examination.
- 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 despatched to USQ within 24 hours 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).

OTHER REQUIREMENTS

- 1 Students will require access to computer and printer facilities to complete and print assignment work using Mathcad software.
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