

ELEC9714

Electricity Industry Planning and Economics



UNSW

THE UNIVERSITY OF NEW SOUTH WALES

School of Electrical Engineering
and Telecommunications

COURSE OUTLINE - Session 1, 2009

1. Course Personnel

The course coordinator and lecturer is:

Dr. Iain MacGill,

Joint Director (Engineering), UNSW Centre for Energy and Environmental Markets (CEEM)
Senior Lecturer, School of Electrical Engineering and Telecommunications.

Room EE124B, i.macgill@unsw.edu.au

A number of guest lectures may be arranged with research and industry experts during the session.

2. Course Details

Availability: The course is available in the following programs: Master of Engineering Science; PhD in Electrical Engineering; Bachelor of Engineering (4th Year Elective substitution). Students undertaking other courses may also be permitted subject to agreement with the School of Electrical Engineering and Telecommunications, and the Course Coordinator.

Credits: This is a 6 UOC post-graduate course.

Lectures: There is one three hour lecture every week 1-12 of semester, Tuesday 6-9pm in Rm OMB114. There are no tutorials or laboratories. The last hour of some lectures may be run in a tutorial format to assist with the assignments – further details will be provided over the semester. The provisional syllabus of these weekly lectures is outlined below.

Prerequisite: Although this subject has no formal prerequisites, it is assumed that each student has a basic working knowledge of the electricity industry. A number of texts are available for students whose undergraduate training did not include this type of material, or who feel that they require revision. Please contact the lecturer to discuss if you have questions regarding this matter.

Old courses: This course replaces ELEC9201 Power System Economics and Planning.

Consultations: Dr MacGill will be available for consultation during and after lectures, or by appointment (arranged at lectures or by email). Please note that he is unlikely to be available for consultations without an appointment.

3. Aims and scope

The purpose of this course is to introduce students to the key features of a restructured electricity industry. The course gives an Australian perspective, considering issues including: the nature of the electricity industry; objectives and options for restructuring; insights from electricity pricing theory; Australia's restructured electricity industry; National Electricity Market design and performance; the role of electricity networks in a restructured electricity industry including market representation, network pricing and network regulation; ancillary services; design and implementation of retail electricity markets; climate change and the electricity industry; and electricity industry regulation.

Considerable attention is given to practical implementation and experience to date in Australia, with comments on other countries when appropriate. Students taking this course will therefore gain a critical appreciation of economics, planning and investment in Australia's restructured industry.

Students taking this course should gain a critical appreciation of planning, economics and investment within Australia's restructured electricity industry. The subject should also provide a basis for further study of this field. The companion course, ELEC9714 Electricity Industry Operation and Control presents decision making approaches and methods to meet industry objectives through appropriate operation of existing, in place, power system equipment. These courses can be taken separately or in either sequence.

4. Learning outcomes

After the successful completion of the course, the student will be able to:

- describe key issues and design and structural choices in electricity industry restructuring
- explain the decision making frameworks involved in restructured industries
- apply conventional investment and spot and derivate market analysis techniques
- assess the design and performance of the Australian National Electricity Market
- appreciate emerging challenges for the electricity industry and the implications for ongoing restructuring

Graduate attributes are the skills, qualities, understandings and attitudes a university agrees its students will develop during their program of study. Some faculties including Engineering have contextualised agreed UNSW-wide Graduate Attributes according to their disciplines and professional areas. The course delivery methods and course content address a number of core UNSW *graduate attributes*; these include:

- The skills involved in scholarly enquiry, in particular, the appreciation of and ability to indulge in research.
- An in-depth engagement with the relevant disciplinary knowledge in its inter-disciplinary context
- Development of analytical and critical thinking.
- Ability to engage in independent learning.
- Information literacy - skills to appropriately locate, evaluate and use relevant information
- Development of effective communication skills
- The skills required for collaborative and multidisciplinary work
- An appreciation of and responsiveness to change

Refer to <http://www.ltu.unsw.edu.au/content/userDocs/GradAttrEng.pdf> for more information.

5. Teaching method

Lectures will make extensive use of PowerPoint slides and white board work. PowerPoint printouts will be provided at the start of lectures and placed on the course website. Additional information and reading materials will also be progressively made available on the course website, but they are no substitute for accurate notes, and active student participation through questions and informal exercises during the lectures.

Students are expected and will benefit from attendance at every lecture. The course will cover a diverse range of material with an approach that is not readily found in text books or the literature. Note that UNSW policy is that you are expected to be regular and punctual in attendance at all classes in the course. See <https://my.unsw.edu.au/student/atoz/AttendanceAbsence.html> for details. Class rolls may be taken.

6. Assessment details

Assessment will consist of a group report on an agreed topic related to material covered in the course; a group oral presentation to the class of the major points in the report, class assignments taken individually, and the final exam. Satisfactory performance in both the class based assessment and examination is required to pass this course. The assigned marks for each assessment component are as follows:

Assessment activity	Assessment (%)
Group student project reports on a topic agreed with the course coordinator by week 5 lecture (submission prior to the end of week 12)	20
Group student presentations on their report topics (over weeks 10-12 in a student order determined by the course coordinators)	10
Individual student assignments during the semester (number and submission dates to be confirmed within the course lectures).	20
Final exam	50

The assignments will reinforce the material discussed in lectures. These must be undertaken by students individually. It is expected that there will be three to four such assignments during the semester. Possible dates for assignment distribution and submission are provided in the provisional course syllabus

The project will involve students in an activity suited to their interests and skills in the area of electricity industry planning and economics. Projects will either focus on

- development and testing of a simple software, spreadsheet or Matlab power system modelling and optimisation tool, or
- an in-depth literature survey of some aspect of electricity industry planning and economics (2500-3000 words plus tables, diagrams, references etc.)

More information on these projects and suitable topics will be distributed in week 3 and project topics are to be negotiated and finalised by week 5. Details on the formal requirements for the

project reports will also be provided at this time. It should contain a significant review of the literature relevant to the topic and a comprehensive bibliography. All source material must be adequately referenced in the body of the report and it is expected that there will be 15 or more scholarly references in a literature survey.

The group oral presentation will take place during class time in weeks 10 through 12. Presentations will be 10 minutes with 5 minutes for questions and should make extensive use of visual aids. An over-head transparency projector and laptop and projector for PowerPoint presentations will be available. A one-page summary should be provided to all members of the class. Assessment will be based on the content and clarity of the presentation and the quality of the one-page summary. Note that students will participate in the assessment through a peer review process. More details will be provided during classes closer to the time of the seminar presentations.

The final exam will cover the lecture material and will be designed to assess comprehension and critical analysis of the material covered during the session.

For all of the non-exam assessment tasks in this course, it is essential that you have a complete understanding of the UNSW official position on 'In-class assessment and plagiarism' as outlined below. Please note that there are severe penalties associated with plagiarism offences.

7. Resources for Students

There is no assigned textbook for this subject. The more recent concepts relevant to electricity industry planning and economics in restructured industries are not easily found in textbooks.

Regular updates and course materials will be added to the ELEC9714 website - found at <http://subjects.ee.unsw.edu.au/elec9714/>. You should check this website frequently. Materials will include pdf versions of the lecture PowerPoints (also provided as printouts prior to each lecture). A range of reports, papers and websites will be uploaded throughout the semester to provide background on electricity industry planning, economics and investment in restructured industries.

Another useful website is that of the UNSW Centre for Energy and Environmental Markets (CEEM) found at www.ceem.unsw.edu.au. It contains useful papers and presentations covering many of the topics that are explored during the course.

8. Other Matters

Academic Honesty and Plagiarism

Plagiarism is the unacknowledged use of other people's work, including the copying of assignment works and laboratory results from other students. Plagiarism is considered a serious offence by the University and severe penalties may apply.

All submitted reports and assignments must have an attached cover-sheet that declares that the work detailed in the report/assignment is entirely that of the named student(s) only. The form is available from the EE&T School web site.

Some guidance on plagiarism is provided here. For more information about plagiarism, please refer to <http://www.lc.unsw.edu.au/plagiarism>.

What is Plagiarism?

Plagiarism is the presentation of the thoughts or work of another as one's own.* Examples include:

- direct duplication of the thoughts or work of another, including by copying material, ideas or concepts from a book, article, report or other written document (whether published or unpublished), composition, artwork, design, drawing, circuitry, computer program or software, web site, Internet, other electronic resource, or another person's assignment without appropriate acknowledgement;

- paraphrasing another person's work with very minor changes keeping the meaning, form and/or progression of ideas of the original;
- piecing together sections of the work of others into a new whole;
- presenting an assessment item as independent work when it has been produced in whole or part in collusion with other people, for example, another student or a tutor; and
- claiming credit for a proportion a work contributed to a group assessment item that is greater than that actually contributed.†

For the purposes of this policy, submitting an assessment item that has already been submitted for academic credit elsewhere may be considered plagiarism.

Knowingly permitting your work to be copied by another student may also be considered to be plagiarism.

Note that an assessment item produced in oral, not written, form, or involving live presentation, may similarly contain plagiarised material.

The inclusion of the thoughts or work of another with attribution appropriate to the academic discipline does *not* amount to plagiarism.

The Learning Centre website is main repository for resources for staff and students on plagiarism and academic honesty. These resources can be located via:

www.lc.unsw.edu.au/plagiarism

The Learning Centre also provides substantial educational written materials, workshops, and tutorials to aid students, for example, in:

- correct referencing practices;
- paraphrasing, summarising, essay writing, and time management;
- appropriate use of, and attribution for, a range of materials including text, images, formulae and concepts.

Individual assistance is available on request from The Learning Centre.

Students are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting, and the proper referencing of sources in preparing all assessment items.

* Based on that proposed to the University of Newcastle by the St James Ethics Centre. Used with kind permission from the University of Newcastle † Adapted with kind permission from the University of Melbourne.

Continual Course Improvement

Students are advised that the course is under constant revision in order to improve the learning outcomes of its students. Please forward any feedback (positive or negative) on the course to the course coordinator or via the Course and Teaching Evaluation and Improvement Process.

Administrative Matters

On issues and procedures regarding such matters as special needs, equity and diversity, occupational health and safety, enrolment, rights, and general expectations of students, please refer to the School policies, see <http://scoff.ee.unsw.edu.au/>

9. Course Schedule

Note that this schedule is provisional at this stage and may be updated during the session. You should attend lectures and regularly check the course website for possible updates.

Provisional Schedule, this version dated 23 February 2009

WEEK	LECTURE	Class tasks	
1	Introduction to the electricity industry and electricity industry restructuring		
2	Introduction to economic, commercial and regulatory perspectives Conceptual model for a restructured electricity industry. Some international experience to date	[out] Assignment 1	
3	Centralised and decentralised decision making frameworks – Techniques for integrated resource planning, price setting,	[in] Assignment 1 [out] Assignment 2 [out] information on projects and topics	
4	Market prices and financial instruments – their role in the electricity industry for investment		
5	Australia's restructured electricity industry National Electricity Market design	[in] Assignment 2 Group project topics finalized by end week 5	
6	Australia's National Electricity Market performance	[out] Assignment 3	
7	Network services and investment		
8	Retail market design and end-use decision making in the electricity industry	[in] Assignment 3 [out] Assignment 4	
9	Sustainable energy futures – climate change, the role of technology assessment		
10	Student group presentations	[in] Assignment 4	
11	Student group presentations		
12	Student group presentations	Group reports due end week 12	