



Professional Development

ENGG 5001 6 Credit Points

**Master's Degree by Coursework
Unit of Study**

**Semester 1, 2009
Tuesday
1.00pm – 3.00pm
*AMME Tutorial Room 3***

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Course material available on Faculty of Engineering website –

<http://www.eng.usyd.edu.au/current-students/InnoManage/ENGG5001/index.shtml>

Course Objectives

To provide:

- ⌚ An introduction to the various elements of engineering practice
- ⌚ An understanding of the role of the engineer in industry
- ⌚ Basic knowledge of the law of contracts and legal responsibility
- ⌚ Teamwork and leadership skills
- ⌚ An understanding of the professional responsibilities of engineers
- ⌚ Competence in verbal communication and presentations
- ⌚ Competence in reading and writing reports
- ⌚ An understanding of ethical considerations.

Outcomes

Students will have a working competence in the various elements of engineering practice, and enhanced communication skills that will assist them in their other technical Units of Study.

Learning Approach

Developing an understanding of the components and processes of professional development and practice is very different from learning engineering. There are no formulae to learn and apply; there is not even a set of right answers, though there are plenty of wrong ones. Hence a different learning approach is required. The essence of professional engineering practice is that you are dealing with people. Different people behave differently in the same, and different situations. The biggest challenge is rarely to work out what to do, but rather to communicate effectively to and motivate a group of people to work out what to do, and how to do it.

Hence it is crucial for you, the student, to arrive at your own understanding so that you can apply it in the varied situations you face in the future. In these circumstances, effective learning occurs with the learner's dynamic involvement. You cannot learn passively by simply listening to lectures - you must positively engage the material and experience of this course.

Through the conceptual material, your reading, and exercises, you will learn to cope with the practical business difficulties of imperfect and incomplete information, conflicting information, divergent personal views and internal organisational politics. It will require you to actively engage in sorting, sifting, categorising, consolidating and transforming data.

The presentation and the project require the ability to work in teams with your fellow students, and to learn from one another's contributions. Hence it will be important for each student to develop the ability to effectively communicate their ideas, and listen to and respect the ideas of others.

Through exposure to a range of problems, you should start to be able to observe coherent patterns emerging. General principles will be drawn out to provide the basis for comparison and analysis in the real world. It will assist you in developing independent thought and responsible judgement.

Format

In general, the first hour of each class will be used to explore and explain the major issues associated with the topic. Class time is spent ensuring that you have understood this material and exploring new developments and extension to the basic concepts.

The remaining hour of class time each week will be spent on exercises, project work and project presentations.

Reading

Textbook; Johnston, R., *Professional Engineering – A Reader*, McGraw Hill 2008

Other relevant books are:

Chang, C. M., *Engineering Management: Challenges in the New Millennium*, Pearson, 2005

Samson, D, (ed) *Management for Engineers*, Prentice Hall, 3rd edition, 2001

Bennett, F.I., *The Management of Engineering: Human, Quality, Organizational, Legal and Ethical Aspects of Professional Practice*, John Wiley, 1996

Beder, S., *The New Engineer: Management and Professional Responsibility in a Changing World*, Macmillan, 2000.

Johnston, S., Gostelow, P., and Jones, E., *Engineering and Society: an Australian Perspective*, Longman, 2nd edition, 1999

Assessment

Formal assessment for this course is designed to recognise both individual and team effort. This is an intentional effort to reflect the business environment where effective teamwork is essential to the achievement of individual success. Active participatory learning will be hallmark of success throughout the course.

1. Essay report - due week 4 (**Tuesday 1 April**) 40%
1000 words, appropriately referenced and structured, on a topic to be distributed in Week 2
2. Presentation (groups of 4) - weeks 5-8 30%
15-minute presentation (3 per week, based on identification of an article in the media (press, radio, television, Internet) relevant to the lecture topic of the previous week. The presentation should describe the article and analyse it, using course material.
3. Project Report (groups of 4) – due week 12 (**Tuesday 27 May**) 30%
Based on a case study of a major engineering success and failure. The potential topic is to be agreed by Week 6. The case study is to be analysed against all the major course issues.

All assignments should be handed in at the end of the teaching period, or into the mailbox at the ACIIC office, Room 246, Link Building, by 4pm on the appropriate Tuesday

Course Outline

- Week 1** Introduction to the Course
Introduction to Engineering Practice – the role of engineers in history
Johnston, Chapter 1
- Week 2** Challenges for the Modern Engineer
The changing roles and employment of engineers in the 21st century. Building your portfolio of management skills and techniques.
Johnston, Chapter 2
- Information Literacy Skills: Tools for information location and retrieval
- Week 3** Effective verbal and written communication
Crucially important skills for engineers are the communication skills of listening, speaking, presenting and writing – weaknesses in these skills are the cause of more engineering failures than all other causes put together. Recognition and practice of the different skills required for different types and contexts of communication.
Johnston, Chapter 8
- Week 4** Creativity, Design and Problem-Solving
Understanding the different ways in which people think; identifying your own preferred thinking mode; the nature of the creative process; means of identifying barriers to creativity; some tools for enhancing creativity; embedding creativity in design; how to solve problems *systematically* in engineering; the stages of problem definition, solution generation, solution decision, implementation and evaluation; techniques for exploring problem definition.
Johnston, Chapters 9-10
- Week 5** Project Management
The nature and typical characteristics of a project; reasons for the growth of project management; the essential elements of effective project management; managing routine versus innovative projects; the key considerations – time, cost and quality; capabilities of an effective project manager
Johnston, Chapters 3 & 6
- Week 6** Teamwork
The importance and prevalence of teamwork; challenges of effective teamwork; application of teamwork skills to problem solving in engineering methods to reduce the development of group work problems; methods to address and resolve problems that arise
Johnston, Chapters 3-5
- Group presentations

Mid-Semester Break

- Week 7** **Leadership**
 The nature and characteristics of leadership and the role of professional engineers as leaders; understanding the variety of forms of appropriate leadership; the critical distinctions between leaders and leadership, and leadership and management; developing a capability in appropriate and effective leadership.
Johnston, Chapter 7
- Group presentations
- Week 8** **Engineering in the Global Knowledge Economy**
 The growth of global commerce, drivers, challenges and achievements of globalisation, the key features of the knowledge economy, managing technological innovation; evolution of industries and technologies; technology diffusion and adoption; approaches to technology forecasting.
- Group presentations
- Week 9** **Ethical Challenges for the Engineering Profession**
 The place of ethics in the practice of engineering; formal ethical responsibilities; engineering and moral complexity; from problem-solving to decision-making; companies and responsibility, the Engineers Australia code of ethics.
Johnston, Chapters 2 & 11
- Week 10** **Professional and Legal Responsibilities of Engineers**
 Liability is a necessary area of knowledge for engineers. Litigation is increasing, as more people challenge the large corporations and demand fair treatment. This is being supported by legislation allowing action against what is deemed to be unfair treatment. The engineer has to be aware that their actions can impact on the general public, and that they have to allow for the use and mis-use of their designs or systems; the legal responsibilities of engineers; Australian liability laws; consumer rights and protection.
Johnston, Chapter 13
- Week 11** **Occupational Health and Safety**
 The legal requirements for safety in the workplace; responsibility for safety in the workplace; applying the current Occupational Health and Safety Act 2000
 (<http://www.workcover.nsw.gov.au/LawAndPolicy/Acts/ohsact.htm>); promoting community awareness of occupational health and safety issues.
Johnston, Chapter 12
- Week 12** **Engineering and the Environment**
 Environmental responsibilities of the engineer; the concept of sustainability; The Institution of Engineers '*Australia's Environmental Principles for Engineers*', the role of engineering in addressing climate change.
Johnston, Chapter 14

