



Mechanical and Manufacturing Engineering

Course Outline

Semester1 2018

GSOE9830

ECONOMIC DECISION ANALYSIS IN ENGINEERING

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1. Staff contact details

Contact details and consultation times for course convenor

Name: Dr Maruf Hasan
Office location: Room 208H, Building J17
Tel: (02) 9385 5629
Fax: (02) 9663 1222
Email: m.hasan@unsw.edu.au

Consultation time for Maruf Hasan is on Fridays between 2.00 and 5.00 pm.

Name: Guy Allinson
School of Petroleum Engineering
Office location: Room 249, Tyree Energy Technology Building
Tel: (02) 9385 5189
Email: g.allinson@unsw.edu.au

Contact details and consultation times for additional demonstrators will be provided on Moodle before the start of semester.

Please see the course [Moodle](#).

2. Important links

- [Moodle](#)
- [UNSW Mechanical and Manufacturing Engineering](#)
- [Course Outlines](#)
- [Student intranet](#)
- [UNSW Mechanical and Manufacturing Engineering Facebook](#)
- [UNSW Handbook](#)

3. Course details

Credit Points:

This is a 6 unit-of-credit (UoC) course, and involves **3** hours per week (h/w) of face-to-face contact.

The UNSW website states “The normal workload expectations of a student are approximately 25 hours per semester for each UoC, including class contact hours, other learning activities, preparation and time spent on all assessable work. Thus, for a full-time enrolled student, the normal workload, averaged across the 16 weeks of teaching, study and examination periods, is about 37.5 hours per week.”

This means that you should aim to spend about 9 h/w on this course. The additional time should be spent in making sure that you understand the lecture material, completing the set assignments, further reading, and revising for any examinations.

There is NO parallel teaching in this course.

Contact Hours

| | Day | Time | Location |
|-----------------------|-----------|-------------|----------------------------------|
| Lectures | Wednesday | 15:00-17:00 | Tyree Engineering Technology G16 |
| Demonstrations | Wednesday | 17:00-18:00 | Ainsworth Building 203 |
| | Wednesday | 17:00-18:00 | Ainsworth Building 204 |

Please refer to your class timetable for the learning activities you are enrolled in and attend only those classes.

Summary and Aims of the course

The course consists of two sections:

- Section 1 (Week 1-6, 13) : Dr Maruf Hasan
- Section 2 (Week 7-12): Guy Allinson

The course will focus on providing comprehensive coverage of the concepts of economic decision analysis in engineering and will also address practical concerns of engineering economic analysis.

The objective of the course is to provide engineers and managers with the knowledge of principles, basic concepts and methodology of economic decision analysis. This will assist the students in developing proficiency with the methods and with the process for making rational decisions they are likely to encounter in professional practice.

Student learning outcomes

This course is designed to address the learning outcomes below and the corresponding Engineers Australia Stage 1 Competency Standards for Professional Engineers as shown. The full list of Stage 1 Competency Standards may be found in Appendix A.

After successfully completing this course, you should be able to:

| Learning Outcome | | EA Stage 1 Competencies |
|------------------|--|--|
| 1. | Apply the knowledge of systematic evaluation of the costs and benefits of proposed technical and business project and ventures | PE 1.2, PE1.3, PE2.4, PE3.4 |
| 2. | Understand cost concepts, cash flows, their estimation and interest formulae. Also, to understand various depreciation methods and learn about the effect of income tax on economy studies | PE1.2, PE1.3, PE3.4 |
| 3. | Be familiar with various methods for economy studies and comparing alternative investments | PE 2.3, PE 2.4, PE3.4 |
| 4. | Understand the role of probability analysis in decision making and decision tree analysis | PE1.1, PE 1.2, PE 1.3, PE2.4, PE3.4 |
| 5. | Value information and analyse a portfolio of investments | PE 2.1, PE 2.2, PE 2.3, PE3.1 - PE 3.6 |
| 6. | Carry out Monte Carlo simulations | PE 2.1, PE 2.2, PE 2.3, PE2.4 |

4. Teaching strategies

Readings and lectures will be used to introduce and explain the theoretical foundations of various economic analysis principles. Problem solving exercises will be used to apply and reinforce the understanding of the concepts and how they can be applied to solve problems encountered in the real world. Students are expected to complete the assigned readings prior to lectures so that they can contribute to class discussions. Students will be required to form groups to discuss and solve the case study problems.

For Section 2 of the course, students should bring a laptop computer to each lecture and each demonstration. Students will use these to help solve the class exercises and demonstration questions.

5. Course schedule

Module A

| Week | Date | Topic | Text reference | Demonstration exercises |
|------|-------|---|----------------|---|
| 1 | 28/02 | Engineering economic decisions, cost concepts, time value of money, interest formulae | 1,4 | 4.1, 5,6, 8, 31 ,36, 57, 65, 66, 68, 70, 71, 73, 77, 79, 80, 81, 82, 85, 91, 111, 115 |
| 2 | 07/03 | Present worth(NPV)analysis, future worth, annual worth | 5 | 5.3, 4, 21, 23, 24, 27, 32 |
| 3 | 14/03 | Internal rate of return, payback period method | 5 | 5. 41, 45, 47, 49, 53, 54, 60, 63, 67 |
| 4 | 21/03 | Comparing alternative investments | 6 | 6.2, 4,12, 13, 15, 19, 28, 31, 35, 37, 41, 45, 52, 53, 57, 67, 70 |
| 5 | 28/03 | Depreciation methods | 7 | 7.7, 8, 11, 12, 14 |
| | 04/04 | Mid-semester break | | |
| 6 | 11/04 | Income taxes | 7 | 7.23, 32, 38, 39, 40, 41, 42, 47, 55, 60 |

Module B

| Week | Date | Topic |
|------|-------|--|
| 7 | 18/04 | Limitations of sensitivity analysis Using probability distributions |
| 8 | 25/04 | Public Holiday |
| 9 | 02/05 | Exploration decisions and Binomial distributions |
| 10 | 09/05 | Decision trees |
| 11 | 16/05 | Value of information |
| 12 | 23/05 | Monte Carlo simulation Portfolio analysis |

Course revision (Week 13)

| | | |
|----|-------|-------------------------|
| 13 | 30/05 | Lecture/Course Revision |
|----|-------|-------------------------|

We reserve the right to change lecturers and topics depending on the availability of the lecturers and the progress of the course

6. Assessment

The assessment will be through class tests and a final examination. The various parts of the course contributing to the overall grade are as follows:

The class test consists of short questions that require short descriptive answers and/or short calculations.

The final examination for the course is a written end-of-session examination of two hours duration and will include material covered in the whole course (Sections 1 and 2). The final exam has questions that require more substantial descriptive answers and/or calculations.

You must be available for all tests and examinations. Final examinations for each course are held during the University examination periods, which are June for Semester 1 and November for Semester 2.

Provisional Examination timetables are generally published on myUNSW in May for Semester 1 and September for Semester 2

For further information on exams, please see the [Exams](#) section on the intranet.

Calculators

You will need to provide your own calculator, of a make and model approved by UNSW, for the examinations. The list of approved calculators is shown at <https://student.unsw.edu.au/exam-approved-calculators-and-computers>

It is your responsibility to ensure that your calculator is of an approved make and model, and to obtain an “Approved” sticker for it from the School Office or the Engineering Student Centre prior to the examination. Calculators not bearing an “Approved” sticker will not be allowed into the examination room.

Assessment overview

| Assessment | Length | Weight | Learning outcomes assessed | Assessment criteria | Due date and submission requirements | Deadline for absolute fail | Marks returned |
|---------------------|----------|--|----------------------------|---|--------------------------------------|----------------------------|----------------------------|
| Module A class test | 1.25 hrs | 20% | 1-3 | Correct descriptions, correct calculations, logical conclusions | Week 5 | N/A | Two weeks after submission |
| Module B class test | 1.25 hrs | 20% | 4 | Correct descriptions, correct calculations, logical conclusions | Week 10 | N/A | Two weeks after submission |
| Final exam | 2 hrs | 60% overall: (30% Module A) (30% Module B) | 1-6 | Correct descriptions, correct calculations, logical conclusions | Exam period, date TBC | N/A | During results period |

Special consideration and supplementary assessment

For details of applying for special consideration and conditions for the award of supplementary assessment, see the [School intranet](#), and the information on UNSW's [Special Consideration page](#).

7. Attendance

You are required to attend a minimum of 80% of all classes, including lectures, labs and seminars. It is possible to fail the course if your total absences equal to more than 20% of the required attendance. Please see the [School intranet](#) and the [UNSW attendance page](#) for more information.

8. Expected resources for students

Text book 1

W.G. Sullivan, E.M. Wicks, C.P. Koelling, "Engineering Economy", Prentice Hall International, 16th Ed., 2014.

This textbook is available for purchase at the UNSW book shop.

Textbook 2 (optional)

“Decision Analysis for Petroleum Exploration”, Paul Newendorp and John Schuyler, Planning Press 2000

UNSW Library website can be accessed at <https://www.library.unsw.edu.au/>

Lecture outlines and course notes will be provided on Moodle.

Moodle: <https://moodle.telt.unsw.edu.au/login/index.php>

9. Course evaluation and development

Feedback on the course is gathered periodically using various means, including the myExperience process, informal discussion in the final Problem solving session for the course, and the School’s Student/Staff meetings. Your feedback is taken seriously, and continual improvements are made to the course based, in part, on such feedback.

In this course recent improvements resulting from previous years’ feedback include more real life examples and case studies and increasing the proportion of coursework for assessment, as well as problems solved in demonstration and provided on Moodle. All of these suggestions are incorporated into the course syllabus.

10. Academic honesty and plagiarism

UNSW has an ongoing commitment to fostering a culture of learning informed by academic integrity. All UNSW students have a responsibility to adhere to this principle of academic integrity. Plagiarism undermines academic integrity and is not tolerated at UNSW. *Plagiarism at UNSW is defined as using the words or ideas of others and passing them off as your own.*

Plagiarism is a type of intellectual theft. It can take many forms, from deliberate cheating to accidentally copying from a source without acknowledgement. UNSW has produced a website with a wealth of resources to support students to understand and avoid plagiarism: student.unsw.edu.au/plagiarism The Learning Centre assists students with understanding academic integrity and how not to plagiarise. They also hold workshops and can help students one-on-one.

You 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 tasks.

If plagiarism is found in your work when you are in first year, your lecturer will offer you assistance to improve your academic skills. They may ask you to look at some online resources, attend the Learning Centre, or sometimes resubmit your work with the problem fixed. However more serious instances in first year, such as stealing another student’s work

or paying someone to do your work, may be investigated under the Student Misconduct Procedures.

Repeated plagiarism (even in first year), plagiarism after first year, or serious instances, may also be investigated under the Student Misconduct Procedures. The penalties under the procedures can include a reduction in marks, failing a course or for the most serious matters (like plagiarism in an honours thesis) even suspension from the university. The Student Misconduct Procedures are available here:

www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf

Further information on School policy and procedures in the event of plagiarism is available on the [intranet](#).

II. Administrative matters and links

All students are expected to read and be familiar with School guidelines and policies, available on the intranet. In particular, students should be familiar with the following:

- [Attendance, Participation and Class Etiquette](#)
- [UNSW Email Address](#)
- [Computing Facilities](#)
- [Assessment Matters](#) (including guidelines for assignments, exams and special consideration)
- [Academic Honesty and Plagiarism](#)
- [Student Equity and Disabilities Unit](#)
- [Health and Safety](#)
- [Student Support Services](#)

Appendix A: Engineers Australia (EA) Competencies

Stage 1 Competencies for Professional Engineers

| | Program Intended Learning Outcomes |
|--|---|
| PE1: Knowledge and Skill Base | PE1.1 Comprehensive, theory-based understanding of underpinning fundamentals |
| | PE1.2 Conceptual understanding of underpinning maths, analysis, statistics, computing |
| | PE1.3 In-depth understanding of specialist bodies of knowledge |
| | PE1.4 Discernment of knowledge development and research directions |
| | PE1.5 Knowledge of engineering design practice |
| | PE1.6 Understanding of scope, principles, norms, accountabilities of sustainable engineering practice |
| PE2: Engineering Application Ability | PE2.1 Application of established engineering methods to complex problem solving |
| | PE2.2 Fluent application of engineering techniques, tools and resources |
| | PE2.3 Application of systematic engineering synthesis and design processes |
| | PE2.4 Application of systematic approaches to the conduct and management of engineering projects |
| PE3: Professional and Personal Attributes | PE3.1 Ethical conduct and professional accountability |
| | PE3.2 Effective oral and written communication (professional and lay domains) |
| | PE3.3 Creative, innovative and pro-active demeanour |
| | PE3.4 Professional use and management of information |
| | PE3.5 Orderly management of self, and professional conduct |
| | PE3.6 Effective team membership and team leadership |