



Mechanical and Manufacturing Engineering

# Course Outline

Term 3 2019

**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 5692  
Fax: (02) 9663 1222  
Email: [m.hasan@unsw.edu.au](mailto:m.hasan@unsw.edu.au)

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

## Contact details and consultation times for additional lecturers/demonstrators/lab staff

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

Guy Allinson is available by appointment on Thursdays in Weeks 6 to 10 between 9.00 am and 12.00 mid-day.

Please see the course [Moodle](#).

## 2. Important links

- [Moodle](#)
- [Lab Access](#)
- [Computing Facilities](#)
- [Student Resources](#)
- [Course Outlines](#)
- [Engineering Student Support Services Centre](#)
- [Makerspace](#)
- [UNSW Timetable](#)
- [UNSW Handbook](#)
- [UNSW Mechanical and Manufacturing Engineering](#)

## 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 normal workload expectations of a student are approximately 25 hours per term for each UOC, including class contact hours, other learning activities, preparation and time spent on all assessable work.

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
<b>Lectures</b>	Thursday	15:00-17:00	Ritchie Theatre
<b>Demonstrations</b>	Thursday	17:00-18:00	Ritchie Theatre

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 1-5) : Dr Maruf Hasan
- Section 2 (Week 6-10): 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

Learning Outcome		EA Stage 1 Competencies
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.	Analyse the value of information	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	Topic	Text reference	Demonstration exercises
1	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	Present worth(NPV)analysis, future worth, annual worth	5	5.3, 4, 21, 23, 24, 27, 32
3	Internal rate of return, payback period method	5	5. 41, 45, 47, 49, 53, 54, 60, 63, 67
4	Comparing alternative investments	6	6.2, 4,12, 13, 15, 19, 28, 31, 35, 37, 41, 45, 52, 53, 57, 67, 70
5	Depreciation methods and Income taxes	7	7.7, 8, 11, 12, 14, 7.23, 32, 38, 39, 40, 41, 42, 47, 55, 60

### Module B

Week	Topic #
6	Uncertainty in decision analysis Sensitivity analysis Probability distributions
7	Using probability distributions Monte Carlo simulation
8	Exploration decisions
9	Binomial distributions
10	Decision trees, Value of information

# The lecturer reserves the right to make minor revisions to the timing of the topics depending on the progress of the lectures and demonstrations.

## 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:

### Assessment overview

Assessment	Group Project? (# Students per group)	Length	Weight	Learning outcomes assessed	Assessment criteria	Due date and submission requirements	Deadline for absolute fail	Marks returned
Module A class test	No	1.25 hrs	20%	1-3	Correct descriptions, correct calculations, logical conclusions	Week 4	N/A	Two weeks after submission
Module B class test	No	1.00 hrs	20%	4	Correct descriptions, correct calculations, logical conclusions	Week 9	N/A	Two weeks after submission
Final exam	No	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

## Examinations

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: February for Summer Term, May for T1, August for T2, and November/December for T3.

Please visit myUNSW for Provisional Examination timetable publish dates.

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

## 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 [Engineering Student Supper Services Centre](#) prior to the examination. Calculators not bearing an “Approved” sticker will not be allowed into the examination room.

## Special consideration and supplementary assessment

If you have experienced an illness or misadventure beyond your control that will interfere with your assessment performance, you are eligible to apply for Special Consideration prior to submitting an assessment or sitting an exam.

**Please note** that UNSW now has a [Fit to Sit / Submit rule](#), which means that if you sit an exam or submit a piece of assessment, you are declaring yourself fit enough to do so and cannot later apply for Special Consideration.

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

# 7. Expected resources for students

## Text book 1

W.G. Sullivan, E.M. Wicks, C.P. Koelling, “Engineering Economy”, Prentice Hall



International, 17th Ed., 2018.

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>

## **8. Course evaluation and development**

Feedback on the course is gathered periodically using various means, including the UNSW myExperience process, informal discussion in the final class 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.

## **9. 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, visit: [student.unsw.edu.au/plagiarism](http://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](http://www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf)

## 10. Administrative matters and links

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

- [Attendance](#)
- [UNSW Email Address](#)
- [Computing Facilities](#)
- [Special Consideration](#)
- [Exams](#)
- [Approved Calculators](#)
- [Academic Honesty and Plagiarism](#)
- [Student Equity and Disabilities Unit](#)
- [Health and Safety](#)
- [Lab Access](#)

# Appendix A: Engineers Australia (EA) Competencies

## Stage 1 Competencies for Professional Engineers

	<b>Program Intended Learning Outcomes</b>
<b>PE1: Knowledge and Skill Base</b>	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
<b>PE2: Engineering Application Ability</b>	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
<b>PE3: Professional and Personal Attributes</b>	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