UNSW SYDNEY | Australia's Global University

Mechanical and Manufacturing Engineering

Course Outline

Term 2 2020

GSOE9830

Economic Decision Analysis in Engineering

Contents

1. Staff contact details

Contact details and consultation times for course convenor

Name: Guy Allinson
Tel: (02) 9385 5189
Email: g.allinson@unsw.edu.au
Moodle: T2 2020 GSOE 9830 Economic Decision Analysis in Engineering
(All assessments and content)
Microsoft Teams Video Chat Hours: Meet with staff of the GSOE Teams live Friday 9:00 – 12:00 mid-day, Weeks:1-10 or by special appointment.

Contact details and consultation times for course demonstrator:

Name: Jiachao Ge
Email: jiachao.ge@unsw.edu.au
Microsoft Teams Chat Hours: Leave questions for Jiachao Ge on the GSOE 9830 Teams chat or schedule a special appointment.

2. Important links

- Moodle
- Lab Access
- Health and Safety
- 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 scheduled online 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.

You should aim to spend about 12 h/w on study outside lecturing hours 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.

Contact hours

	Day	Time	Delivery Mode
Lectures & tutorials	Fridays	3 hrs per week	Moodle and Teams for GSOE 9830
Teams Chat/ Office Hours	Fridays	9:00 - 12:00 mid-day and by appointment	GSOE9830 Teams

All classes in T2 2020 will be online. Please consult this course's Moodle module for details about delivery.

Summary and Aims of the course

The course consists of two sections:

- Section 1 (Weeks 1-5) Net Cash Flow and Economic Indicators
- Section 2 (Weeks 6-10): Risk Analysis

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 students in developing proficiency with the methods and with the processes 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	PE1.2, PE1.3, PE2.4, PE3.4
2.	Understand cost concepts, cash flows and economic indicators. To understand the effect of income tax on economic decisions including tax depreciation methods	PE1.2, PE1.3, PE3.4
3.	Be familiar with various methods of economic analyses used for comparing alternative investments	PE2.3, PE2.4, PE3.4

Learning Outcome		EA Stage 1 Competencies
4.	Understand the role of probability analysis in decision making and decision tree analysis	PE1.1, PE1.2, PE1.3, PE2.4, PE3.4
5.	Analyse the value of information	PE2.1, PE2.2, PE2.3, PE3.1, PE3.6
6.	Carry out Monte Carlo simulations	PE2.1, PE2.2, PE2.3, 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 all sections 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

Week	Topic
1	Introduction, Net cash flow analysis, Net cash flow and profit, Taxation.
2	Tax and loss carry forward, Sunk Costs, Inflation, Real and Nominal cash flow
3	Net present value (NPV), Features of NPV, Real and Nominal NPVs
4	Internal Rate of Return (IRR), Multiple IRRs, Comparing Investments
5	Incremental net cash flow, Tax relief. Mid-term Exam
6	Uncertainty in decision analysis, Sensitivity analysis, Probability distributions
7	Using skewed probability distributions, Monte Carlo simulation
8	Uncertain decisions and risk sharing
9	Many investments
10	Decision trees, Value of information
11	Final Exam

#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

Assessment overview

Assessment	Group Project?	Length	Weight	Learning outcomes assessed	Assessment criteria	Due date and submission requirements	Deadline for absolute fail	Marks returned
Interactive Quizzes	No	Short	0%	1-6	Correct answers	Weekly	N/A	Immediately
Mid-Term Exam	No	1.75 hours	50%	1-3	Correct descriptions, correct calculations, logical conclusions	Week 5	N/A	Two weeks after submission
Final exam	No	1.75 hours	50%	4-6	Correct descriptions, correct calculations, logical conclusions	Week 11	N/A	Upon release of final results

Presentation

All submissions are expected to be neat and clearly set out. Your results are the pinnacle of all your hard work and should be treated with due respect. Presenting results clearly gives the marker the best chance of understanding your method; even if the numerical results are incorrect.

Submission

Work submitted late without an approved extension by the course coordinator or delegated authority is subject to a late penalty of 20 percent (20%) of the maximum mark possible for that assessment item, per calendar day.

The late penalty is applied per calendar day (including weekends and public holidays) that the assessment is overdue. There is no pro-rata of the late penalty for submissions made part way through a day.

Work submitted after the 'deadline for absolute fail' is not accepted and a mark of zero will be awarded for that assessment item.

For some assessment items, a late penalty may not be appropriate. These are clearly indicated in the course outline, and such assessments receive a mark of zero if not completed by the specified date. Examples include:

a. Weekly online tests or laboratory work worth a small proportion of the subject mark, or
b. Online quizzes where answers are released to students on completion, or
c. Professional assessment tasks, where the intention is to create an authentic assessment that has an absolute submission date, or
d. Pass/Fail assessment tasks.

Marking

Marking guidelines for assessment submissions will be provided at the same time as assessment details to assist with meeting assessable requirements. Submissions will be marked according to the marking guidelines provided.

Examinations

The exams consist of short questions that require short descriptive answers and/or short calculations. .

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 Examination timetable dates.

For further information on exams, please see the Exams webpage

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 attempt 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

- Lecture outlines, course notes and exercises will be provided on Moodle.

Suggested reading (optional for risk analysis section)

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

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, 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. 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

10. Administrative matters and links

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

- Attendance
- UNSW Email Address
- Special Consideration
- Exams
- Approved Calculators
- Academic Honesty and Plagiarism
- Equitable Learning 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