



Course Outline

Semester 1, 2015

Never Stand Still

Faculty of Engineering

School of Mechanical and Manufacturing Engineering

GSOE9830

Economic Decision Analysis in Engineering

CONTENTS

1. STAFF CONTACT DETAILS	3
2. COURSE DETAILS	3
3. RATIONALE FOR INCLUSION OF CONTENT AND TEACHING APPROACH.	5
4. TEACHING STRATEGIES	5
5. ASSESSMENT	6
6. ACADEMIC HONESTY AND PLAGIARISM	7
7. COURSE SCHEDULE	8
8. RESOURCES FOR STUDENTS	9
9. COURSE EVALUATION AND DEVELOPMENT	9
10. ADMINISTRATIVE MATTERS	9

GSOE9830 ECONOMIC DECISION ANALYSIS IN ENGINEERING**COURSE OUTLINE****1. STAFF CONTACT DETAILS**

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2. COURSE DETAILS

The course consists of two sections:

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

Units of Credit

This is a 6 unit-of-credit (UoC) course, and involves 3 hours per week (h/w) of lectures, problem solving sessions and group discussion.

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.”

For a standard 24 UoC in the semester, this means 600 hours, spread over an effective 15 weeks of the semester (thirteen weeks plus stuvac plus one effective exam week), or 40 hours per week, for an average student aiming for a credit grade. Various factors, such as your own ability, your target grade, etc., will influence the time needed in your case. Some students spend much more than 40 h/w, but you should aim for not less than 40 h/w on coursework for 24 UoC.

This means that you should aim to spend not less than about 10 h/w on this course, i.e. an additional 7 h/w of your own time. This should be spent in making sure that you understand the lecture material, completing the set assignments, further reading about the course material, and revising and learning for the examination.

Aims of the course

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 to develop proficiency with the methods and with the process for making rational decision they are likely to encounter in professional practice.

Student learning outcomes

By successfully completing Section1 of the course, the student should be able to:

1. apply the knowledge of systematic evaluation of the costs and benefits of proposed technical and business project and ventures.
2. identify what is needed to perform an engineering economy study.
3. understand cost concepts, cash flows, their estimation and interest formulae.
4. be familiar with various methods for economy studies and comparing alternative investments.
5. understand various depreciation methods and learn about the effect of income tax on economy studies.
6. use spreadsheet functions to solve engineering economy problems.

Section 2 of the course aims to help students understand:

- the role of probability analysis in decision making.
- decision tree analysis.
- how to value information.
- how to carry our Monte Carlo simulations
- how to analyse a portfolio of investments

Graduate Attributes

UNSW's graduate attributes are shown at

<https://my.unsw.edu.au/student/atoz/GraduateAttributes.html>

UNSW aspires to develop graduates who are rigorous scholars, capable of leadership and professional practice in a global community. The university has, thus, articulated the following Graduate Attributes as desired learning outcomes for ALL UNSW students.

UNSW graduates will be

1. Scholars who are:
 - (a) understanding of their discipline in its interdisciplinary context
 - (b) capable of independent and collaborative enquiry ✓
 - (c) rigorous in their analysis, critique, and reflection
 - (d) able to apply their knowledge and skills to solving problems ✓
 - (e) ethical practitioners
 - (f) capable of effective communication ✓
 - (g) information literate ✓
 - (h) digitally literate

2. Leaders who are:
 - (a) enterprising, innovative and creative
 - (b) capable of initiating as well as embracing change
 - (c) collaborative team workers

3. Professionals who are:
 - (a) capable of independent, self-directed practice ✓
 - (b) capable of lifelong learning
 - (c) capable of operating within an agreed Code of Practice

4. Global Citizens who are:
 - (a) capable of applying their discipline in local, national and international contexts ✓
 - (b) culturally aware and capable of respecting diversity and acting in socially just/responsible ways
 - (c) capable of environmental responsibility ✓

✓ = Developed in this course

In this course, you will be encouraged to develop Graduate Attributes 1(b), 1(d), 1(f), 1(g), 3(a), 4(a) and 4(c) by undertaking the selected activities and knowledge content. These attributes will be assessed within the prescribed assessment tasks, as shown in the assessment table on Page 5.

3. RATIONALE FOR INCLUSION OF CONTENT AND TEACHING APPROACH.

The course aims to enable the students to acquire skills and knowledge of basic concepts and methodology of economic decision analysis. Students will be required to learn the theoretical foundations of various principles of economic analysis and how they can be applied to solve problems encountered in industry and business. The students will be actively engaged in teaching and learning process through problem solving exercises and case study analysis.

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 tutorial. Students will use these to help solve the class exercises and tutorial questions.

5. ASSESSMENT

General

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

Section 1 (contributes 50% to the overall mark)

<u>Assessment Task</u>	<u>Weighting</u>
Class Test (Wk 5)	15%
Final Exam	35%

The class test is a multiple choice question test and consist of solving of problems.

Section 2 (contributes 50% to the overall mark)

<u>Assessment Task</u>	<u>Weighting</u>
Class Test (date to be announced later)	15%
Final Exam	35%

The class test consists of short questions that require short descriptive answers and/or short calculations. The final exam has questions that require more substantial descriptive answers and/or calculations.

Examination

The final examination for the course is a written end of session examination of three hours duration and will include material covered in the whole course (Section 1 and 2).

Calculators

You will need to provide your own calculator, of a make and model approved by UNSW, for the examination. 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.

Special Consideration and Supplementary Assessment

For details of applying for special consideration and conditions for the award of supplementary assessment, see *Administrative Matters for All Courses*, available from the School office as part of *The Guide*, or on the School website.

6. ACADEMIC HONESTY AND PLAGIARISM

Plagiarism is using the words or ideas of others and presenting them 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 booklet which provides essential information for avoiding plagiarism: <https://my.unsw.edu.au/student/academiclife/Plagiarism.pdf>

There is a range of resources to support students to avoid 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. Information is available on the dedicated website Plagiarism and Academic Integrity website: <http://www.lc.unsw.edu.au/plagiarism/index.html>

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 a honours thesis) even suspension from the university. The Student Misconduct Procedures are available here: <http://www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf>

Further information on School policy and procedures in the event of plagiarism is presented in a School handout, *Administrative Matters for All Courses*, available on the School website.

7. COURSE SCHEDULE

Section 1 (Week 1-6)

Week	Date	Topic	Text ref.	Tutorial exercises
1	3/3	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	10/3	Present worth(NPV)analysis, future worth, annual worth	5	5.3, 4, 21, 23, 24, 27, 32
3	17/3	Internal rate of return, payback period method	5	5.41, 45, 47, 49, 53, 54, 60, 63, 67,
4	24/3	Comparing alternative investments	6	6.2, 4, 12, 13, 15, 19, 28, 31, 35, 37, 41, 45, 52, 53, 57, 67, 70
5	31/3	Depreciation methods;	7	7.7, 8, 11, 12, 14
	7/4	Mid-semester Break	.	.
6	14/4	Income taxes	7	7.23, 32, 38, 39, 40, 41, 42, 47, 55, 60

Section 2 (Week 7-12)

Week	Date	Topic
7	21/04	Limitations of sensitivity analysis Using probability distributions
8	28/04	Exploration decisions
9	05/05	Binomial distributions
10	12/05	Decision trees
11	19/05	Value of information
12	26/05	Monte Carlo simulation Portfolio analysis

Course revision (Week 13)

13	02/06	Course Revision
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We reserve the right to change lecturers and topics depending on the availability of the lecturers and the progress of the course

8. 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. Lecture outlines will be provided on Blackboard/Moodle.

Textbook 2 (optional)

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

Course notes for the Section 2 of the course are provided on Blackboard/Moodle.

9. COURSE EVALUATION AND DEVELOPMENT

Feedback on the course is gathered periodically using various means, including the Course and Teaching Evaluation and Improvement (CATEI) 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 year's feedback include more real life examples and case studies and increasing the proportion of coursework for assessment as well as problems solved in tutorial and provided on Moodle. All of these suggestions are incorporated into the course syllabus.

10. ADMINISTRATIVE MATTERS

You are expected to have read and be familiar with [Administrative Matters](#), available on the School website. This document contains important information on student responsibilities and support, including special consideration, assessment, health and safety, and student equity and diversity.

Maruf Hasan and Guy Allinson
February 2015