Course Outline

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Course Details

Course Code	GSOE9210
Course Title	Decision Methods for Engineers
Units of Credit	6
Course Website	http://cse.unsw.edu.au/~gs9210 (http://cse.unsw.edu.au/~gs9210)
Handbook Entry	http://www.handbook.unsw.edu.au/postgraduate/courses/current/GSOE9210.html (http://www.handbook.unsw.edu.au/postgraduate/courses/current/GSOE9210.html)

Course Summary

The topics covered in this course include:

- Decision problems
- Representing decision problems
- Decision-making under uncertainty
- Measuring belief and uncertainty
- Measuring preference
- Decisions involving others

Course Timetable

The course timetable is available here (/GSOE9210/16s2/timetable) .

Course Aims

The course helps engineering graduates develop knowledge, skills, and techniques to make better decisions in the types of complex situations that they may encounter as practicing engineers. Emphasis is on developing an understanding of universal methods and techniques that can be applied to problems in a wide range of different engineering contexts.

Student Learning Outcomes

Following completion of this course students should have developed an understanding of methods and techniques that support decision-making in complex situations.

Students will learn basic techniques used to model and analyse complex problems, and apply their learnings to guide decision-making in engineering contexts.

General educational benefits

Extensive analytical techniques and problem-solving practice empower engineering graduates to make informed decisions in engineering contexts.

Examples drawn from a range of science and engineering applications emphasise the cross-disciplinary relevance of all the acquired learning. Rigorous reasoning and problem solving skills prepare graduating students for further postgraduate science and engineering programs and for their future professional careers.

Assumed Knowledge

There are no formal prerequisites for this course other than general logical reasoning and problem-solving skills. Some elementary knowledge of probability and statistics and discrete mathematics may be helpful but is not essential.

Teaching Rationale

Ron Howard, Professor of Economic-Engineering Systems at Stanford:

> “If . . . decision-theoretic structures do not in the future occupy a large part of the education of engineers, then the engineering profession will find that its traditional role of managing scientific and economic resources for the benefit of man has been forfeited to another profession.”

—Ron Howard (1966).

This course is taught by a combination of theory and practice. Each lecture combines an explanation of the relevant concepts combined with exercises to develop practical skills for making complex decisions.

Teaching Strategies

This course consists of:

- Lectures: classes that introduce basic concepts and show examples
- Tutorials/exercises: held within class to reinforce concepts, provide additional examples, and provide problem solving practice
- Student consultations: scheduled regularly in-session to provide additional support for student learning

Assessment

The final mark for the course is based on a mid-term paper and a final exam. The mid-term paper is worth 30% and the final exam is worth 70% of the final mark. The dates and times of the mid-term will be announced in class closer to the date.

The course uses a full grading scheme, following the UNSW scale

> 85+ → HD, 75–84 → DN, 65–74 → CR, 50–64 → PS

Supplementary assessment

For information about special consideration, including the date of the Supplementary Exam, please read CSE Student Conduct (https://www.engineering.unsw.edu.au/computer-science-engineering/about-us/organisational-structure/student-services/policies/student-conduct) .

For information about UNSW's policy regarding Supplementary assessments, see https://student.unsw.edu.au/special-consideration (https://student.unsw.edu.au/special-consideration) .

The supplementary exam is for those who believe that, due to circumstances beyond their control, their original mark in some assessment was significantly worse than they would get under normal circumstances. Students who sit a supplementary exam do so with the understanding that, prior to knowing the outcome of the assessment, the original mark for that assessment will be discarded; that is, a student should only apply for special consideration for an assessment for which he or she is prepared to forfeit the original assessment's mark. Note that original assessment marks, final exam marks, and grades, will not be released to students prior to completion of the supplementary exam.

Academic Honesty and Plagiarism

Plagiarism is defined as (https://student.unsw.edu.au/what-plagiarism) *using the words or ideas of others and presenting them as your own* . UNSW and CSE treat plagiarism as academic misconduct, which means that it carries penalties as severe as being excluded from further study at UNSW. There are several on-line sources to help you understand what plagiarism is and how it is dealt with at UNSW:

- Learning Centre: Plagiarism and Academic Integrity (http://www.lc.unsw.edu.au/plagiarism/index.html)
- MyUNSW: Plagiarism (https://student.unsw.edu.au/plagiarism) and Academic Misconduct (https://www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf)
- CSE: Addendum to UNSW Plagiarism Guidelines (http://www.cse.unsw.edu.au/~chak/plagiarism/plagiarism.html)
- CSE: Yellow Form (http://www.cse.unsw.edu.au/people/studentoffice/policies/yellowform.html) (whose terms you have agreed to)

Make sure that you read and understand these. Ignorance is not accepted as an excuse for plagiarism.

Course Schedule

The course consists of twelve (12) weeks of classes. Each class will consist of a theoretical (lecture) and practical (tutorial) component. The practical component will consist of model exercise problems and solutions worked out during class.

Assessment for this course consists of a mid-term paper and a final exam. The dates and times of the mid-term paper will be announced closer to the date.

Resources for Students

Class materials are available on the website; no login is needed. They consist of class notes (and copies of the slides), tutorial problems and reference material.

The lectures are recorded and are available to students through UNSW's student gateway.

There is no prescribed textbook for the course. The posted materials are sufficient to prepare for the exams.

Reference books

Luce and Raiffa. *Games and Decisions* . Dover, 1957.
One of the classic references on game and decision theory. Middle to advanced level. Most relevant for the latter parts of the course.
Straffin, P. *Game theory and strategy* . Mathematical Association of America, 1993.

Course Evaluation and Development

Student feedback on this course will be obtained via electronic survey at the end of session, and will be used to make ongoing improvements to the course. Students are also encouraged to provide informal feedback during the session, and to let the lecturer in charge know of any problems, as soon as they arise. Suggestions will be listened to very openly, positively, constructively and thankfully, and every reasonable effort will be made to address them.

The course has been well-received by students in previous terms.

In response to feedback from previous course offerings the course material will seek to closely emphasise the applicability of the methods to practical problems.

Resource created 5 years ago (Wednesday 20 July 2016, 01:24:41 PM), last modified 5 years ago (Sunday 25 September 2016, 12:15:14 PM).

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