# Course Outline

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## Course Details

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| **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 (/GSOE9210/17s2/timetable) .

## Course Aims

The course helps engineering graduates develop knowledge, skills, and techniques to make better decisions in the types of complex situations which 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 successful completion of this course students should have developed an understanding the theory of decision-making, and some of the analytical methods and techniques to 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).

## Teaching Strategies

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. More specifically, the teaching components include:

- Lectures: classes that introduce basic concepts and give examples
- Tutorials: part of each class is devoted to working through problems and case studies examples
- Forums: this website has a forum for students to discuss the course material. The forum provides a student-oriented, collaborative approach to learning from/with one's peers
- Exercises: released each week for students to practice solving problems
- 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/essential-advice-for-cse-students) .

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, due to circumstances beyond their control, were unable to complete some assessment, or who believe that their original mark was affected so as to be significantly worse than they would score under normal circumstances. In the latter case, 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. Therefore, 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. The difficulty of the supplementary exam may exceed that of the original assessment.

For this course, special consideration requests must be accompanied with a certificate from the relevant authority (eg, doctor, lawyer, etc.). This must be accompanied with a completed and signed *Professional Authority form* ( https://student.unsw.edu.au/sites/all/files/upload... (https://student.unsw.edu.au/sites/all/files/uploads/group47/forms/ProfessionalAuthority.pdf) ). Please ensure you take a copy of the form with you to the relevant authority, and submit the completed form with your special consideration request. Special consideration requests which do provide this information will be deemed inadmissible.

## 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 treats 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 consists 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. See the course menu on the left for more information.

There is no prescribed textbook for the course. The posted materials are sufficient to prepare for the exams. Additional reference materials will be provided during the course.

**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 for this course will be obtained via an electronic survey at the end of session, for the purposes of ongoing improvements to the course. Students are encouraged to provide informal feedback during the session, and to advise the lecturer in charge of any important matters that arise. Feedback is welcome, and will be received openly, positively, constructively, and thankfully.

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

In response to feedback from previous course offerings the course material seeks to closely emphasise the applicability and relevance of the learnings to practical engineering problems.

Resource created 4 years ago (Friday 21 July 2017, 09:50:10 PM), last modified 4 years ago (Tuesday 28 November 2017, 01:00:28 PM).

Comments (/GSOE9210/17s2/forums/search?forum_choice=resource/11510) (/GSOE9210/17s2/forums/resource/11510)

Victor Jauregui (/users/z9900583) 4 years ago (Sun Jul 30 2017 01:09:57 GMT+1000 (AEST))

> Dear Victor,
> You said that our mid-term test would be held before the mid-break in the form of multiple choice questions, and could you please tell us if it would be held during lecture hour or other time?

I've moved the above question to this forum, where it might be more relevant. At this stage the plan is to have the test at the lecture time, if possible. I will provide more information closer to the date.

Anqi Chen (/users/z5175298) 4 years ago (Tue Sep 05 2017 03:13:30 GMT+1000 (AEST))

Hi Professor,

Could you please provide more information about the mid-term exam? What are the question types? What is the scope of the exam? Can you provide us with some sample exam paper to practice?

Thank you and looking forward to your reply.

Kindest,

Anqi.

Zhi He (/users/z5123906) 4 years ago (Fri Aug 11 2017 03:23:40 GMT+1000 (AEST))

so the time of mid-term is probably the lecture time of week 9?

Qilin Huang (/users/z5093037) 4 years ago (Sun Jul 30 2017 22:16:47 GMT+1000 (AEST))

Thank you for your reply.

Have a good day