Course Outline

GSOE9210
Engineering Decision Methods
Semester 2 2015

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Course Staff

Contact Details

Staff Name	Role	Email	Phone
Victor Jauregui	Course Convenor	vicj at cse.unsw.edu.au	

Consultations

Staff Name	Day/Time	Location

Course Details

Course Code:	GSOE9210
Course Title:	Engineering Decision Methods
Units of Credit:	6
Course WebSite:	http://www.cse.unsw.edu.au/~gs9210/
Handbook Entry:	http://www.handbook.unsw.edu.au/postgraduate/courses/2015/GSOE9210.html

Lectures

For class details please visit the 'Classes' section.

Classes start in Week 2, Term 2, 2015. There are classes in Weeks 2Â–13: Tuesday 4 August (first class) to Tuesday 27 October (last). One can add freely throughout Week 2; following that one needs approval from the lecturer.

Course Summary

The topics covered include:

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

Course Aims

The course supports the vocational needs of engineering graduates by helping them develop problem solving

techniques for the types of decision-making situations that they may face as practicing engineers. Emphasis is on developing an understanding of universal methods that can be applied to problems in a wide range of different engineering domains.

Assumed Knowledge

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

Student Learning Outcomes

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

Students will learn basic techniques required to model and analyse decision making problems, and to utilise appropriate methods to guide their decisions in engineering contexts.

General educational benefits

Extensive analytical techniques and problem-solving practice should empower students with the confidence 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.

Teaching Rationale

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

> *Â“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.Â”*
>
> Â—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 the practical solution to problems. In this way students are exposed to the required concepts and trained in their application.

Teaching Strategies

Each class combines conceptual material with practical problem solving questions designed to improve understanding and prepare the students for the assessment tasks. Lecture recordings (projector and voice) may be made available, but use of any private recording devices in class is not permitted. Lecture recordings should not be considered a suitable substitute for attending classes.

Lecture notes and exercises are available on the course website. The current week's lecture notes will usually be released before the lecture date, to facilitate independent learning. Practice exercises will also be made available on-line, and selected solutions provided.

Lectures

Lectures present the core material of all the topics, with strong emphasis on the applicability of the subject matter. At the same time they define the content of the course and the examinable material. All lectures emphasise the relevance of the subject in the context of further courses, giving links to applications.

Classroom practicum

Lectures also include a component dedicated to practical problems and their solutions. The practical component typically comprises practical exercises. They and their solutions are discussed in the class. Many worked solutions will be provided.

Individual consultation and tutoring

Individual consultation can be very helpful and is always available, in the scheduled period, throughout the lecture and exam period. If additional time be needed a prior email or verbal inquiry is suggested. Please check the consultations section for available times.

Postgraduate courses do not carry separately scheduled tutorials, their design reflecting a measure of independent training on part of the postgraduate students. Private tutoring is often available through

> *https://www.cse.unsw.edu.au/db/DOdbs/Tutor/find/index.html*
> *http://do.cse.unsw.edu.au/tutor/index.html*

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 mid-term will be held in week nine (9) (September 22).

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

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

A supplementary exam is offered only on the basis of a Â‘Consideration requestÂ’. Such a request must lodged (at Student Central) within three days of the exam date. The supplementary exam is administered by the School of Computer Science and Engineering. The exam is comprehensive, based on the entire course material. It applies only to the Final exam; there is no Supplementary for any missed take-home tests.

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, their original mark will be discarded. 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 any student prior to completion of the supplementary exam.

For information about special consideration, including the date of the Supplementary Exam, please click here.

Academic Honesty and Plagiarism

Plagiarism is defined as "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
- MyUNSW: Plagiarism and Academic Misconduct
- CSE: Addendum to UNSW Plagiarism Guidelines
- CSE: Yellow Form (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 can be found on the course calendar.

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.

There is no prescribed textbook for the course. The posted materials are sufficient to prepare for the exams. A few supplementary textbooks will be placed on the Open Reserve in the Library of the UNSW.

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 continual 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.

In response to feedback from previous course offerings the course material will seek to closely emphasise the

applicability of the methods studied to practical engineering decision problems.