



Course specification

Description: Advanced Optimisation						
Subject	Cat-nbr	Class	Term	Mode	Units	Campus
MAT	8200	45070	2, 2005	ONC	1.00	Toowoomba

Academic group:	FOSCI
Academic org:	FOS003
Student contribution band:	2
ASCED code:	010101

STAFFING

Examiner: Tony Roberts

Moderator: Mingren Shi

REQUISITES

Pre-requisite: MAT1200 and MAT2100

OTHER-REQUISITES

Recommended prior studies: MAT3201

RATIONALE

We should constantly strive to improve processes. The tools of optimisation are many and varies depending upon the nature of the task and the form in which information is available. This is a wide ranging course to learn about the best methods in situations relevant to students interests.

SYNOPSIS

Contact the examiner to study this course by distance education. This course flexibly covers advanced topics in optimisation theory and applications such as linear, integer, nonlinear, dynamic programming, stochastic programming, and discrete and continuous optimisation. Further the course covers selected topics from game theory in economics, heuristic problem solving such as genetic algorithms for stochastic optimisation, and other powerful methods of constrained and unconstrained nonlinear optimisation. Enrolment requires the approval of the examiner. This course is normally offered only in odd years.

OBJECTIVES

On completion of this course students will be able to:

1. formulate optimisation problems and identify feasible methods;
2. implement appropriate optimisation algorithms;
3. interpret and report on outcomes and strengths and weaknesses of a variety of optimisation methods;

4. use optimisation techniques in applications such as economic games, management, simulation, approximation and research.

TOPICS

Description	Weighting (%)
1. Advanced Optimisation: topics to be negotiated with Examiner but should include the methods and applications of some of: interior methods in linear optimisation; integer programming; quadratic and convex programming; dynamic programming, stochastic dynamic programming; zero-sum game theory; Nash solution of many player games; oligopoly and auctions; genetic algorithms; Nelder--Mead downhill simplex method; direction set (Powell's) methods; conjugate gradient and quasi-Newton methods; variable metric methods; Lagrange multiplier methods; simulated annealing and other taboo searches; maximum entropy and maximum likelihood applications; advanced calculus of variations.	100.00

TEXT and MATERIALS required to be PURCHASED or ACCESSED

ALL textbooks and materials are available for purchase from USQ BOOKSHOP (unless otherwise stated). Orders may be placed via secure internet, free fax 1800642453, phone 07 46312742 (within Australia), or mail. Overseas students should fax +61 7 46311743, or phone +61 7 46312742. For costs, further details, and internet ordering, use the 'Textbook Search' facility at <http://bookshop.usq.edu.au> click 'Semester', then enter your 'Course Code' (no spaces).

Computer facilities for numerical work.

Course web site: <http://www.sci.usq.edu.au/courses/mat8200>

REFERENCE MATERIALS

Reference materials are materials that, if accessed by students, may improve their knowledge and understanding of the material in the course and enrich their learning experience.

Other research books and articles as advised depending upon chosen topics.

Bertsekas, DP 1999, *Nonlinear programming*, 2nd edn, Athena Scientific, Belmont, Mass.

Bertsekas, DP 1996, *Constrained optimisation and Lagrange multiplier methods*, Athena Scientific, Belmont, Mass.

Best, MJ & Ritter, K 1985, *Linear programming: active set analysis*, Prentice-Hall Inc.

Buck, BB & Macauley, VA 1991, *Maximum entropy in action*, Oxford University Press,

Coleman, AM 1995, *Game theory and its applications*, Butterworth - Heinemann,

Osborne, MJ 2004, *An introduction to game theory*, Oxford University Press, New York.

Osborne, MJ & Rubinstein, A 1994, *A course in games theory*, MIT Press, Cambridge, Mass.

Press, WH, Teukolsky, SA, Vetterling, WT & Flannery, BP 2004, 'Numerical recipes Books' (Available: <http://www.nr.com/>).

Roberts, AJ 'LaTeX: from quick and dirty to style and finesse' (Available: <http://www.sci.usq.edu.au/staff/aroberts/LaTeX/latexintro.html>) .

(Updated May 2004)

Vanderbei, RJ 2001, *Linear programming: foundations and extensions*, Kluwer Academic Publishers, Boston.

Williams, JD 1986, *The compleat strategyst*, Dover Publications, New York.

STUDENT WORKLOAD REQUIREMENTS

ACTIVITY	HOURS
Assessment	40.00
Consultation	7.00
Directed Study	120.00
Examinations	2.00

ASSESSMENT DETAILS

Description	Marks out of	Wtg(%)	Due date
ASSIGNMENT 1	100.00	20.00	19 Jul 2005 (see note 1)
ASSIGNMENT 2	100.00	20.00	19 Jul 2005
ASSIGNMENT 3	100.00	20.00	19 Jul 2005
2HR OPEN EXAMINATION	100.00	40.00	END S2 (see note 2)

NOTES

1. The Examiner will advise the due dates for Assignments 1, 2 and 3.
2. Examination dates will become available during the semester. Please refer to the examination timetable when published.

IMPORTANT ASSESSMENT INFORMATION

- 1 Attendance requirements:
It is the students' responsibility to attend and participate appropriately in all activities (such as lectures, tutorials, laboratories and practical work) scheduled for them, and to study all material provided to them or required to be accessed by them to maximise their chance of meeting the objectives of the course and to be informed of course-related activities and administration.
- 2 Requirements for students to complete each assessment item satisfactorily:
To complete each of the assessment items satisfactorily, students must obtain at least 50% of the marks available for each assessment item.
- 3 Penalties for late submission of required work:
If students submit assignments after the due date without prior approval then a penalty of 20% of the total marks available for the assignment will apply for each working day late.
- 4 Requirements for student to be awarded a passing grade in the course:

To be assured of receiving a passing grade a student must submit all of the summative assessment items, achieve at least 50% in the examination and at least 50% of the available weighted marks for the summative assessment items.

- 5 Method used to combine assessment results to attain final grade:
The final grades for students will be assigned on the basis of the weighted aggregate of the marks obtained for each of the summative assessment items in the course.
- 6 Examination information:
In an Open Examination, candidates may have access to any material during the examination except the following: electronic communication devices, bulky materials, devices requiring mains power and material likely to disturb other students.
- 7 Examination period when Deferred/Supplementary examinations will be held:
Any Deferred or Supplementary examinations for this course will be held during the examination period at the end of the semester of the next offering of this course.
- 8 University Regulations:
Students should read USQ Regulations 5.1 Definitions, 5.6. Assessment, and 5.10 Academic Misconduct for further information and to avoid actions which might contravene University Regulations. These regulations can be found at the URL <http://www.usq.edu.au/corporateservices/calendar/part5.htm> or in the current USQ Handbook.

ASSESSMENT NOTES

- 9 The due date for an assignment is the date by which a student must despatch the assignment to the USQ. The onus is on the student to provide proof of the despatch date, if requested by the Examiner.
- 10 If requested, students will be required to provide a copy of assignments submitted for assessment purposes. Such copies should be despatched to USQ within 24 hours of receipt of a request being made.