STAT279

Operations Research I

S2 Evening 2017

Dept of Statistics

Contents

Disclaimer

Macquarie University has taken all reasonable measures to ensure the information in this publication is accurate and up-to-date. However, the information may change or become out-dated as a result of change in University policies, procedures or rules. The University reserves the right to make changes to any information in this publication without notice. Users of this publication are advised to check the website version of this publication [or the relevant faculty or department] before acting on any information in this publication.

General Information

Unit convenor and teaching staff
Lecturer
Kj Byun
kj.byun@mq.edu.au
Contact via kj.byun@mq.edu.au
Room 6.14, #12 Wally's Walk
TBA

Lecturer and Unit Convenor
David Bulger
david.bulger@mq.edu.au
Contact via david.bulger@mq.edu.au
Room 5.30, #12 Wally's Walk
TBA

Credit points
3

Prerequisites
STAT150 or STAT170(P) or STAT171

Corequisites

Co-badged status

Unit description
This unit surveys the field of operations research, which is the practical application of scientific method to the operational, organisational and economic problems of business and industry. An elementary knowledge of algebra is assumed. Students are expected to use Microsoft Excel to find solutions to formulated problems. Topics are model construction; linear programming; transportation and assignment problems; simulation; network analysis (critical path and PERT); inventory analysis; and waiting line models.

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at https://www.mq.edu.au/study/calendar-of-dates

Learning Outcomes

On successful completion of this unit, you will be able to:

Apply mathematical models to business scenarios, and formulate problems

Use a computer package to find solutions to formulated problems

Interpret output and write up conclusions based on the output, in the language of the original problem

Assessment Tasks

Name	Weighting	Hurdle	Due
Homework	6%	No	See iLearn site
Electronic Quizzes	25%	No	See iLearn site
Assignment	9%	No	Week before break
Final Examination	60%	No	University Examination Period

Homework

Due: **See iLearn site**
Weighting: **6%**

All Homework problems will be available in electronic form on iLearn for students to download. There will be six Homework sets, worth 1% each. Students should solve the problems and submit their solutions via iLearn as Microsoft Word (.doc or .docx) or Adobe Portable Document Format (.pdf) files. Hand-written solutions are not encouraged, but may be scanned to create pdf documents (a scanner is available for student use in the Library photocopy room). For your own records, label your submissions with your student ID, name and the number of the Homework (e.g., "Week 2"). Your homework submission will be recorded automatically, and email submissions cannot be accepted. If you foresee difficulty submitting your homework electronically, please contact the unit convenor as early as possible. **The submitted Homework will NOT be marked or returned**; however, a model solution will be made available on iLearn as feedback to students. This solution will be made available a few days after the Homework is due.

Each Homework task requires students to understand the procedures, content and methodology covered in the preceding weeks and to apply them to the problems presented. If students have satisfied all of the learning objectives for a topic, they will be able to successfully complete the corresponding Homework.

You will be given full credit for each Homework exercise submission (a solution or a serious attempt to solve a home work exercise).

On successful completion you will be able to:

- Apply mathematical models to business scenarios, and formulate problems
- Use a computer package to find solutions to formulated problems

- Interpret output and write up conclusions based on the output, in the language of the original problem

Electronic Quizzes

Due: **See iLearn site**
Weighting: **25%**

Electronic Quizzes will be provided for practice of new skills acquired during the course. These will be available via the web. Links to the Quizzes can be found on the STAT279 iLearn site.

There are five electronic Quizzes, each worth 5%. The first Quiz will cover assumed knowledge. Each remaining Quiz covers material learned in the weeks preceding it.

The Quizzes may be attempted as many times as you wish before the due date. (A different Quiz will be generated for each attempt.) Your highest score in each Quiz will be used in grading.

Altogether, the Quizzes are worth 25% of total unit grade. Because you can have as many attempts as you wish, you should be able to do well in all of the Quizzes, and get a very high mark.

The Quizzes are online, and therefore may be attempted on campus, in the Library, the Numeracy Centre or the various computing labs, or at home depending on your system configuration. Waiting until the due date and then having technical problems does not constitute a reasonable excuse for not completing a Quiz on time. Students are advised to start work early.

If you have a question regarding Quizzes, post it to the Discussion Forum on iLearn.

Be responsible and complete your Quizzes on time. No extensions for Quizzes will be granted unless satisfactory documentation outlining illness or misadventure covering the entire week before the due date is submitted.

On successful completion you will be able to:
- Apply mathematical models to business scenarios, and formulate problems

Assignment

Due: **Week before break**
Weighting: **9%**

There will be an individual assignment due in the week before the semester break, worth 9% of total unit grade.

The assignment will be issued via iLearn. Submission instructions will be included in the set assignment. No extensions will be granted, but special consideration may be given to documented cases of unavoidable disruption.

Three core criteria will be used to assess students' work:

- Knowledge development: understanding of key ideas and concepts

- Application: ability to apply operations research methods to actual problems
- Presentation: the extent to which work has been written and presented in a manner consistent with academic standards.

On successful completion you will be able to:

- Apply mathematical models to business scenarios, and formulate problems
- Use a computer package to find solutions to formulated problems
- Interpret output and write up conclusions based on the output, in the language of the original problem

Final Examination

Due: **University Examination Period**
Weighting: **60%**

The Final Exam will be held during the exam period. It will be worth 60% of the total unit grade and will cover the whole semester's work. The exam duration is two hours, plus ten minutes' reading time. In the exam, students will be provided with copies of the z-table and formula sheet, but these are also available on iLearn and in the Study Pack, and students should familiarise themselves with the z-table and formula sheet before the Exam. Students may bring into the Final Exam any additional formulae, notes and diagrams they might think necessary on one A4 sheet of paper handwritten on both sides. It must be written by hand, not typed.

The final examination enables students to display their understanding of each topic and to demonstrate their analytic skills in identifying the statistical methods appropriate to solving problems in a wider context.

If you notify the University of your disruption to studies for your final examination, you must make yourself available during the supplementary examination period, 11–15 December 2017. If you are not available at that time, there is no guarantee an additional examination time will be offered. Specific examination dates and times will be determined at a later date.

On successful completion you will be able to:

- Apply mathematical models to business scenarios, and formulate problems
- Use a computer package to find solutions to formulated problems
- Interpret output and write up conclusions based on the output, in the language of the original problem

Delivery and Resources

Classes

Each student enrols in one 3-hour Lecture and one 1-hour Practical. (Note that 'Practicals' are sometimes called 'tutorials.') The Lectures begin in Week 1 and the Practicals begin in Week 2.

Required and Recommended Texts and/or Materials

- Students should download the Study Pack from the unit's *iLearn* site. It includes Lecture notes and Practical material.
- Students must download the Homework Exercises from the STAT279 *iLearn* site.
- Reference books available in the library include:

Quantitative Decision Making with Spreadsheet Applications (7th Ed) by Lawrence L. Lapin, William D. Whisler, 2002 (Library Call Number: HD30.23 .L36/2002) or *Quantitative methods for business decisions: with cases* (6th edition) by Lawrence L. Lapin, 1994 (Library Call Number: HD30.23 .L36/1994)

Operations Research Applications and Algorithms (3d Ed), 1994 by Winston W. L. (PWS Kent) (Library Call Number: T57.6 .W645/1994) or *Operations Research* (4th Ed), 2004 by Winston W. L. (Duxbury Press)

Operations Research: An Introduction (8th edition) 2007 by Hamdy A. Taha (Pearson/Prentice Hall) (Library Call Number: T57.6 T3 2007)

Technology Used and Required

Microsoft Excel

Some of the learning and assessment activities will require students to use the spreadsheet application *Excel*. This application is ubiquitous in modern organisations, and it is anticipated that exposure to *Excel* in STAT279 will directly benefit many students in their future careers. *Excel* is available on student workstations throughout the campus.

iLearn Page

STAT279 has an *iLearn* (Online Unit) page, which students can access by logging on at https://ilearn.mq.edu.au. Homework exercises and other materials will be uploaded for students to download. The Discussion Forum will be used for out-of-class communications. The Forum is essentially an online chat between the students, tutors and lecturers. Questions can be asked in the Forum, and might be answered by classmates, tutors or lecturers.

Questions not of interest to or appropriate for the rest of the class (questions about individual marks, missed classes, et cetera) should be sent via e-mail to one of the lecturers using Macquarie University student e-mail accounts.

The lecturers will make announcements via the *iLearn* page. Accordingly, students should be sure to log in and read the posts at least twice a week.

Teaching and Learning Strategy

Students should attend the Lectures each week at which new material is introduced.

From Week 2 onward, there will be one assessment task due each week, which will be either a Homework exercise, an Electronic Quiz or an Assignment.

Students are expected to attend one Practical class each week. Practicals begin in Week 2. There is usually another Practical class cancelled near the mid-semester break; see the unit schedule on the iLearn site for details.

Unit Schedule

Please see the *iLearn* site's first section for an approximate weekly schedule.

Learning and Teaching Activities

Lectures

Lectures in which lecturers introduce new techniques and students practice the techniques on example problems.

Practicals

Practical sessions in which students solve problems and present their solutions to the class. Note that Practicals start in Week 2.

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central. Students should be aware of the following policies in particular with regard to Learning and Teaching:

Academic Honesty Policy http://mq.edu.au/policy/docs/academic_honesty/policy.html

Assessment Policy http://mq.edu.au/policy/docs/assessment/policy_2016.html

Grade Appeal Policy http://mq.edu.au/policy/docs/gradeappeal/policy.html

Complaint Management Procedure for Students and Members of the Public http://www.mq.edu.au/policy/docs/complaint_management/procedure.html

Disruption to Studies Policy (in effect until Dec 4th, 2017): http://www.mq.edu.au/policy/docs/disruption_studies/policy.html

Special Consideration Policy (in effect from Dec 4th, 2017): https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policies/special-consideration

In addition, a number of other policies can be found in the Learning and Teaching Category of Policy Central.

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/support/student_conduct/

Results

Results shown in *iLearn*, or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in eStudent. For more information visit ask.mq.edu.au.

Student Support

Macquarie University provides a range of support services for students. For details, visit http://students.mq.edu.au/support/

Learning Skills

Learning Skills (mq.edu.au/learningskills) provides academic writing resources and study strategies to improve your marks and take control of your study.

- Workshops
- StudyWise
- Academic Integrity Module for Students
- Ask a Learning Adviser

Student Services and Support

Students with a disability are encouraged to contact the Disability Service who can provide appropriate help with any issues that arise during their studies.

Student Enquiries

For all student enquiries, visit Student Connect at ask.mq.edu.au

IT Help

For help with University computer systems and technology, visit http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/.

When using the University's IT, you must adhere to the Acceptable Use of IT Resources Policy. The policy applies to all who connect to the MQ network including students.

Graduate Capabilities

Creative and Innovative

Our graduates will also be capable of creative thinking and of creating knowledge. They will be imaginative and open to experience and capable of innovation at work and in the community. We want them to be engaged in applying their critical, creative thinking.

This graduate capability is supported by:

Learning outcome

- Apply mathematical models to business scenarios, and formulate problems

Assessment tasks

- Homework
- Assignment
- Final Examination

Learning and teaching activities

- Lectures in which lecturers introduce new techniques and students practice the techniques on example problems.
- Practical sessions in which students solve problems and present their solutions to the class. Note that Practicals start in Week 2.

Capable of Professional and Personal Judgement and Initiative

We want our graduates to have emotional intelligence and sound interpersonal skills and to demonstrate discernment and common sense in their professional and personal judgement. They will exercise initiative as needed. They will be capable of risk assessment, and be able to handle ambiguity and complexity, enabling them to be adaptable in diverse and changing environments.

This graduate capability is supported by:

Learning outcome

- Apply mathematical models to business scenarios, and formulate problems

Assessment tasks

- Homework
- Electronic Quizzes
- Assignment
- Final Examination

Learning and teaching activities

- Lectures in which lecturers introduce new techniques and students practice the techniques on example problems.
- Practical sessions in which students solve problems and present their solutions to the class. Note that Practicals start in Week 2.

Commitment to Continuous Learning

Our graduates will have enquiring minds and a literate curiosity which will lead them to pursue knowledge for its own sake. They will continue to pursue learning in their careers and as they participate in the world. They will be capable of reflecting on their experiences and relationships with others and the environment, learning from them, and growing - personally, professionally and socially.

This graduate capability is supported by:

Assessment tasks

- Homework

- Assignment

Learning and teaching activities

- Lectures in which lecturers introduce new techniques and students practice the techniques on example problems.

- Practical sessions in which students solve problems and present their solutions to the class. Note that Practicals start in Week 2.

Discipline Specific Knowledge and Skills

Our graduates will take with them the intellectual development, depth and breadth of knowledge, scholarly understanding, and specific subject content in their chosen fields to make them competent and confident in their subject or profession. They will be able to demonstrate, where relevant, professional technical competence and meet professional standards. They will be able to articulate the structure of knowledge of their discipline, be able to adapt discipline-specific knowledge to novel situations, and be able to contribute from their discipline to inter-disciplinary solutions to problems.

This graduate capability is supported by:

Learning outcomes

- Apply mathematical models to business scenarios, and formulate problems

- Use a computer package to find solutions to formulated problems

- Interpret output and write up conclusions based on the output, in the language of the original problem

Assessment tasks

- Homework

- Electronic Quizzes

- Assignment

- Final Examination

Learning and teaching activities

- Lectures in which lecturers introduce new techniques and students practice the techniques on example problems.

- Practical sessions in which students solve problems and present their solutions to the class. Note that Practicals start in Week 2.

Critical, Analytical and Integrative Thinking

We want our graduates to be capable of reasoning, questioning and analysing, and to integrate and synthesise learning and knowledge from a range of sources and environments; to be able to critique constraints, assumptions and limitations; to be able to think independently and

systemically in relation to scholarly activity, in the workplace, and in the world. We want them to have a level of scientific and information technology literacy.

This graduate capability is supported by:

Learning outcomes

- Apply mathematical models to business scenarios, and formulate problems
- Use a computer package to find solutions to formulated problems
- Interpret output and write up conclusions based on the output, in the language of the original problem

Assessment tasks

- Homework
- Electronic Quizzes
- Assignment
- Final Examination

Learning and teaching activities

- Lectures in which lecturers introduce new techniques and students practice the techniques on example problems.
- Practical sessions in which students solve problems and present their solutions to the class. Note that Practicals start in Week 2.

Problem Solving and Research Capability

Our graduates should be capable of researching; of analysing, and interpreting and assessing data and information in various forms; of drawing connections across fields of knowledge; and they should be able to relate their knowledge to complex situations at work or in the world, in order to diagnose and solve problems. We want them to have the confidence to take the initiative in doing so, within an awareness of their own limitations.

This graduate capability is supported by:

Learning outcomes

- Apply mathematical models to business scenarios, and formulate problems
- Use a computer package to find solutions to formulated problems
- Interpret output and write up conclusions based on the output, in the language of the original problem

Assessment tasks

- Homework
- Electronic Quizzes

- Assignment
- Final Examination

Learning and teaching activities

- Lectures in which lecturers introduce new techniques and students practice the techniques on example problems.
- Practical sessions in which students solve problems and present their solutions to the class. Note that Practicals start in Week 2.

Effective Communication

We want to develop in our students the ability to communicate and convey their views in forms effective with different audiences. We want our graduates to take with them the capability to read, listen, question, gather and evaluate information resources in a variety of formats, assess, write clearly, speak effectively, and to use visual communication and communication technologies as appropriate.

This graduate capability is supported by:

Learning outcomes

- Apply mathematical models to business scenarios, and formulate problems
- Interpret output and write up conclusions based on the output, in the language of the original problem

Assessment tasks

- Homework
- Assignment
- Final Examination

Learning and teaching activities

- Lectures in which lecturers introduce new techniques and students practice the techniques on example problems.
- Practical sessions in which students solve problems and present their solutions to the class. Note that Practicals start in Week 2.

Changes from Previous Offering

The content of the current offering of STAT279 will not differ substantially from the previous offering.

Changes since First Published

Date	Description
14/07/ 2017	Updated the Assessment section on 14 July with the dates of the supplementary exam week.