



# STAT2579

## Operations Research I

Session 1, In person-scheduled-weekday, North Ryde 2022

*School of Mathematical and Physical Sciences*

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## General Information

Unit convenor and teaching staff

Unit Convenor/Lecturer

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Contact via Email

12WW 610

see iLearn

Credit points

10

Prerequisites

FOSE1015 or STAT170(P) or STAT1170 or STAT171 or STAT1371 or STAT150 or STAT1250

Corequisites

Co-badged status

Unit description

This unit surveys the field of operations research, which is the practical application of a 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; network analysis (critical path and PERT); inventory analysis and waiting lines.

## 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:

**ULO1:** Apply mathematical modelling principles to real and simulated business scenarios.

**ULO2:** Use Excel Solver to find solutions to linear programming, transportation and assignment problems and interpret the output.

**ULO3:** Use the Critical Path Method (CPM) and Project Evaluation and Review

Technique (PERT) for optimal project scheduling.

**ULO4:** Formulate an inventory policy which will control the stock of goods at a minimum total cost in inventory models.

**ULO5:** Evaluate probabilities of various queue lengths, average queue length and the average time spent waiting in a queue.

## General Assessment Information

**ASSIGNMENT SUBMISSION:** Assignment submission will be online through the iLearn page.

Submit assignments online via the appropriate assignment link on the iLearn page.

- Assignment submission is via iLearn. You should upload this as a single scanned PDF file.
- It is your responsibility to make sure your assignment submission is legible.

You may submit as often as required prior to the due date/time. Please note that each submission will completely replace any previous submissions. It is in your interests to make frequent submissions of your partially completed work as insurance against technical or other problems near the submission deadline.

### LATE SUBMISSION OF WORK:

- All electronic quizzes must be done by the official due date and time.
- In the case of late submission of an assignment, if special consideration has NOT been granted, the following deductions will be applied to the awarded assessment mark: 12 to 24 hours late = 10% deduction; for each day thereafter, an additional 10% per day or part thereof (including weekends and/or public holidays) will be applied until five days beyond the due date. After this time, a mark of zero (0) will be given.

**FINAL EXAM POLICY:** It is Macquarie University's policy not to set early examinations for individuals or groups of students. All students are expected to ensure that they are available until the end of the teaching semester, that is, the final day of the official examination period. The only excuse for not sitting an examination at the designated time is because of documented illness or unavoidable disruption. In these special circumstances, you may apply for special consideration via [ask.mq.edu.au](https://ask.mq.edu.au).

If you receive special consideration for the final exam, a supplementary exam will be scheduled in the interval between the regular exam period and the start of the next session. By making a special consideration application for the final exam you are declaring yourself available for a resit during this supplementary examination period and will not be eligible for a second special consideration approval based on pre-existing commitments. Please ensure you are familiar with the policy prior to submitting an application.

## Assessment Tasks

Name	Weighting	Hurdle	Due
<a href="#">iLearn Quizzes</a>	20%	No	Week 3, 6, 9,11
<a href="#">Assignment 1</a>	10%	No	Week 4
<a href="#">Assignment 2</a>	10%	No	Week 8
<a href="#">Final Examination</a>	60%	No	University Examination Period

### iLearn Quizzes

Assessment Type [1](#): Quiz/Test

Indicative Time on Task [2](#): 15 hours

Due: **Week 3, 6, 9,11**

Weighting: **20%**

iLearn quizzes may be attempted multiple times. Reinforce and apply skills learned in lectures

On successful completion you will be able to:

- Use Excel Solver to find solutions to linear programming, transportation and assignment problems and interpret the output.
- Use the Critical Path Method (CPM) and Project Evaluation and Review Technique (PERT) for optimal project scheduling.
- Formulate an inventory policy which will control the stock of goods at a minimum total cost in inventory models.

### Assignment 1

Assessment Type [1](#): Quantitative analysis task

Indicative Time on Task [2](#): 8 hours

Due: **Week 4**

Weighting: **10%**

Reinforce and apply skills learned in lectures and SGTAs. Apply linear programming principles to business scenarios.

On successful completion you will be able to:

- Apply mathematical modelling principles to real and simulated business scenarios.

## Assignment 2

Assessment Type <sup>1</sup>: Quantitative analysis task

Indicative Time on Task <sup>2</sup>: 8 hours

Due: **Week 8**

Weighting: **10%**

Reinforce and apply skills learned in lectures and SGTAs. Apply mathematical models to simulated business scenarios.

On successful completion you will be able to:

- Apply mathematical modelling principles to real and simulated business scenarios.
- Use Excel Solver to find solutions to linear programming, transportation and assignment problems and interpret the output.
- Formulate an inventory policy which will control the stock of goods at a minimum total cost in inventory models.

## Final Examination

Assessment Type <sup>1</sup>: Examination

Indicative Time on Task <sup>2</sup>: 2 hours

Due: **University Examination Period**

Weighting: **60%**

Formal invigilated examination testing the learning outcomes of the unit.

On successful completion you will be able to:

- Apply mathematical modelling principles to real and simulated business scenarios.
- Use Excel Solver to find solutions to linear programming, transportation and assignment problems and interpret the output.
- Use the Critical Path Method (CPM) and Project Evaluation and Review Technique (PERT) for optimal project scheduling.
- Formulate an inventory policy which will control the stock of goods at a minimum total cost in inventory models.

- Evaluate probabilities of various queue lengths, average queue length and the average time spent waiting in a queue.
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<sup>1</sup> If you need help with your assignment, please contact:

- the academic teaching staff in your unit for guidance in understanding or completing this type of assessment
- the [Writing Centre](#) for academic skills support.

<sup>2</sup> Indicative time-on-task is an estimate of the time required for completion of the assessment task and is subject to individual variation

## Delivery and Resources

**The Lectures begin in Week 1 online.**

**The SGTAs (1- hour per week) begin in Week 2.**

Required and Recommended Texts and/or Materials

- The lecture slides and SGTA material will be made available via *iLearn*.
- Reference books:
  1. *Quantitative Decision Making with Spreadsheet Applications* (7th Ed) by Lawrence L. Lapin, William D. Whisler, 2002
  2. *Operations Research Applications and Algorithms* (4th Ed), 2004 by Winston W. L. (PWS Kent)
  3. *Operations Research: An Introduction* (8th edition), 2007 by Hamdy A. Taha (Pearson/ Prentice Hall)

Technology Used and Required

**Microsoft Excel**

***iLearn***

Students can access the *iLearn* page by logging on at <https://ilearn.mq.edu.au>. Students must log in regularly to read the Announcements and access the teaching material.

## Unit Schedule

Study Week	Lecture topic	Assessment Due
1	Introduction; LP formulation	
2	LP formulation; graphical solution	
3	Solving LPs	Electronic Quiz
4	Sensitivity Analysis	Assignment 1
5	Simulation	
6	Inventory	Electronic Quiz
	<i>Mid - Session Break</i>	
7	Project management	
8	Project management cont.	Assignment 2
9	Transportation	Electronic Quiz
10	Transportation cont.	
11	Queuing	Electronic Quiz

Study Week	Lecture topic	Assessment Due
12	Revision	

## Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central](https://policies.mq.edu.au) (<https://policies.mq.edu.au>). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- [Academic Appeals Policy](#)
- [Academic Integrity Policy](#)
- [Academic Progression Policy](#)
- [Assessment Policy](#)
- [Fitness to Practice Procedure](#)
- [Assessment Procedure](#)
- [Complaints Resolution Procedure for Students and Members of the Public](#)
- [Special Consideration Policy](#)

Students seeking more policy resources can visit [Student Policies](https://students.mq.edu.au/support/study/policies) (<https://students.mq.edu.au/support/study/policies>). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

To find other policies relating to Teaching and Learning, visit [Policy Central](https://policies.mq.edu.au) (<https://policies.mq.edu.au>) and use the [search tool](#).

## Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: <https://students.mq.edu.au/admin/other-resources/student-conduct>

## Results

Results published on platform other than [eStudent](#), (eg. iLearn, Coursera etc.) 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](https://ask.mq.edu.au) or if you are a Global MBA student contact [globalmba.support@mq.edu.au](mailto:globalmba.support@mq.edu.au)

## Academic Integrity

At Macquarie, we believe [academic integrity](#) – honesty, respect, trust, responsibility, fairness and courage – is at the core of learning, teaching and research. We recognise that meeting the expectations required to complete your assessments can be challenging. So, we offer you a



range of resources and services to help you reach your potential, including free [online writing and maths support](#), [academic skills development](#) and [wellbeing consultations](#).

## Student Support

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

### The Writing Centre

[The Writing Centre](#) provides resources to develop your English language proficiency, academic writing, and communication skills.

- [Workshops](#)
- [Chat with a WriteWISE peer writing leader](#)
- [Access StudyWISE](#)
- [Upload an assignment to Studiosity](#)
- [Complete the Academic Integrity Module](#)

The Library provides online and face to face support to help you find and use relevant information resources.

- [Subject and Research Guides](#)
- [Ask a Librarian](#)

## Student Services and Support

Macquarie University offers a range of [Student Support Services](#) including:

- [IT Support](#)
- [Accessibility and disability support](#) with study
- Mental health [support](#)
- [Safety support](#) to respond to bullying, harassment, sexual harassment and sexual assault
- [Social support](#) including information about finances, tenancy and legal issues

## Student Enquiries

Got a question? Ask us via [AskMQ](#), or contact [Service Connect](#).

## IT Help

For help with University computer systems and technology, visit [http://www.mq.edu.au/about\\_us/offices\\_and\\_units/information\\_technology/help/](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.