



MATH111

Quantitative Methods for Science

S1 Day 2018

Dept of Mathematics

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General Information

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By appointment

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See iLearn

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Credit points

3

Prerequisites

Corequisites

Co-badged status

Unit description

This unit provides an introduction to the basic quantitative methods and techniques common to much of Science. In this unit, you will learn how to formulate scientific problems using mathematical and statistical language; be equipped with a range of techniques to analyse and solve these problems, and gain an understanding of how to interpret the solutions obtained. Amongst other topics, this unit will cover rates of change, graphical display and interpretation of data, logarithmic and exponential scales, basic statistical ideas; all in the context of scientific measurement and analysis.

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:

Able to demonstrate knowledge of basic principles and concepts of fundamental mathematical and statistical techniques

Apply introductory statistical/mathematical concepts to problems in multiple science disciplines

Identify the mathematical/statistical principles underlying basic discipline-specific problems

Able to model and interpret scientific data at an introductory level

Extract and present qualitative information from a model and/or data set, including the use of graphical methods and appropriate software

Able to present and explain simple examples of the role of mathematics/statistics in multiple science disciplines

At the end of this unit students will be able to: Demonstrate foundational learning skills including active engagement in their learning process.

General Assessment Information

HURDLES: Attendance at, and reasonable engagement in, tutorials in all first year mathematics units is **compulsory**. Participation will be assessed by tutors via rosters and observation of students' work during classes. Attendance and reasonable engagement in the class activities in, at least 10 out of 12 of the tutorial classes are requirements to pass the unit.

IMPORTANT: If you apply for Disruption to Study for your final examination, you must make yourself available for the supplementary exam period. If you are not available in this period, there is no guarantee an additional examination time will be offered. Specific examination dates and times will be determined at a later date.

ATTENDANCE and PARTICIPATION: Please contact the unit convenor as soon as possible if you have difficulty attending and participating in any classes. There may be alternatives available to make up the work. If there are circumstances that mean you miss a class, you can apply for a [disruption to study](#).

Assessment Tasks

Name	Weighting	Hurdle	Due
Weekly exercises	20%	No	Weekly
Assignment 1	20%	No	Week 8

Name	Weighting	Hurdle	Due
<u>Assignment 2</u>	20%	No	Week 12
<u>Final Examination</u>	40%	No	Exam period

Weekly exercises

Due: **Weekly**

Weighting: **20%**

Each week's tutorial will include a short quiz on material covered in the previous tutorial.

On successful completion you will be able to:

- Able to demonstrate knowledge of basic principles and concepts of fundamental mathematical and statistical techniques
- Apply introductory statistical/mathematical concepts to problems in multiple science disciplines
- Identify the mathematical/statistical principles underlying basic discipline-specific problems
- Able to model and interpret scientific data at an introductory level
- Extract and present qualitative information from a model and/or data set, including the use of graphical methods and appropriate software
- Able to present and explain simple examples of the role of mathematics/statistics in multiple science disciplines
- At the end of this unit students will be able to: Demonstrate foundational learning skills including active engagement in their learning process.

Assignment 1

Due: **Week 8**

Weighting: **20%**

Essay relating to the role of mathematics and statistics in various science disciplines.

On successful completion you will be able to:

- Able to demonstrate knowledge of basic principles and concepts of fundamental mathematical and statistical techniques
- Apply introductory statistical/mathematical concepts to problems in multiple science disciplines
- Identify the mathematical/statistical principles underlying basic discipline-specific

problems

- Able to model and interpret scientific data at an introductory level
- Extract and present qualitative information from a model and/or data set, including the use of graphical methods and appropriate software
- Able to present and explain simple examples of the role of mathematics/statistics in multiple science disciplines
- At the end of this unit students will be able to: Demonstrate foundational learning skills including active engagement in their learning process.

Assignment 2

Due: **Week 12**

Weighting: **20%**

Assignment questions providing an opportunity to demonstrate understanding and mastery of the concepts of the unit

On successful completion you will be able to:

- Able to demonstrate knowledge of basic principles and concepts of fundamental mathematical and statistical techniques
- Apply introductory statistical/mathematical concepts to problems in multiple science disciplines
- Identify the mathematical/statistical principles underlying basic discipline-specific problems
- Able to model and interpret scientific data at an introductory level
- Extract and present qualitative information from a model and/or data set, including the use of graphical methods and appropriate software
- Able to present and explain simple examples of the role of mathematics/statistics in multiple science disciplines
- At the end of this unit students will be able to: Demonstrate foundational learning skills including active engagement in their learning process.

Final Examination

Due: **Exam period**

Weighting: **40%**

2 hour written examination

On successful completion you will be able to:

- Able to demonstrate knowledge of basic principles and concepts of fundamental

mathematical and statistical techniques

- Apply introductory statistical/mathematical concepts to problems in multiple science disciplines
- Identify the mathematical/statistical principles underlying basic discipline-specific problems
- Able to model and interpret scientific data at an introductory level
- Extract and present qualitative information from a model and/or data set, including the use of graphical methods and appropriate software
- Able to present and explain simple examples of the role of mathematics/statistics in multiple science disciplines

Delivery and Resources

- Three hours of lectures per week
- One 1-hour tutorial per week

Unit Schedule

26/02/2018	Computation and Measurement in Science	
05/03/2018	Predictions and theories in Science	
12/03/2018	Displaying data and interpreting graphs in Science	
19/03/2018	Oscillations, growth and decay in Science	
26/03/2018	Measuring rates of change in Science	
03/04/2018	Optimisation in Science	
9/04/2018	Accumulation of change in Science	
30/04/2018	Predicting outcomes based on theories relating to change in Science	A1
07/05/2018	Describing collections of data in Science	
14/05/2018	Random variation and chance in Science	A2
21/05/2018	Using statistical tests to validate theories in Science	

28/05/2018	Transforming data into a mathematical model in Science
04/06/2018	Revision

Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central \(https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central\)](https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central). 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](#)
- [Grade Appeal Policy](#)
- [Complaint Management Procedure for Students and Members of the Public](#)
- [Special Consideration Policy](#) (**Note:** *The Special Consideration Policy is effective from 4 December 2017 and replaces the Disruption to Studies Policy.*)

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

If you would like to see all the policies relevant to Learning and Teaching visit [Policy Central \(https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central\)](https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/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/study/getting-started/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

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:

Assessment task

- Assignment 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:

Learning outcome

- At the end of this unit students will be able to: Demonstrate foundational learning skills including active engagement in their learning process.

Assessment tasks

- Weekly exercises
- Assignment 1

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

- Able to demonstrate knowledge of basic principles and concepts of fundamental mathematical and statistical techniques
- Apply introductory statistical/mathematical concepts to problems in multiple science disciplines
- Identify the mathematical/statistical principles underlying basic discipline-specific problems
- Able to model and interpret scientific data at an introductory level
- Extract and present qualitative information from a model and/or data set, including the use of graphical methods and appropriate software
- Able to present and explain simple examples of the role of mathematics/statistics in multiple science disciplines
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Assessment tasks

- Weekly exercises
- Assignment 1
- Assignment 2

- Final Examination

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

- Able to demonstrate knowledge of basic principles and concepts of fundamental mathematical and statistical techniques
- Apply introductory statistical/mathematical concepts to problems in multiple science disciplines
- Identify the mathematical/statistical principles underlying basic discipline-specific problems
- Able to model and interpret scientific data at an introductory level
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- Able to present and explain simple examples of the role of mathematics/statistics in multiple science disciplines
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Assessment tasks

- Weekly exercises
- Assignment 1
- Assignment 2
- Final Examination

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

- Able to demonstrate knowledge of basic principles and concepts of fundamental mathematical and statistical techniques
- Apply introductory statistical/mathematical concepts to problems in multiple science disciplines
- Identify the mathematical/statistical principles underlying basic discipline-specific problems
- Able to model and interpret scientific data at an introductory level
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- Able to present and explain simple examples of the role of mathematics/statistics in multiple science disciplines
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Assessment tasks

- Weekly exercises
- Assignment 1
- Assignment 2
- Final Examination

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

- Extract and present qualitative information from a model and/or data set, including the use of graphical methods and appropriate software
- Able to present and explain simple examples of the role of mathematics/statistics in multiple science disciplines
- At the end of this unit students will be able to: Demonstrate foundational learning skills including active engagement in their learning process.

Assessment tasks

- Weekly exercises
- Assignment 1
- Assignment 2
- Final Examination

Changes since First Published

Date	Description
23/02/2018	Change of due date of assignment 2. Correcting dates in unit schedule.