# ACST8095

# Actuarial Data Analytics

Session 2, In person-scheduled-weekday, North Ryde 2022

*Department of Actuarial Studies and Business Analytics*

# Contents

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# General Information

Unit convenor and teaching staff
Unit Convenor
Maggie Lee
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Lecturer
Pavel Shevchenko
pavel.shevchenko@mq.edu.au

Credit points
10

Prerequisites
Permission by special approval

Corequisites

Co-badged status

Unit description
This unit covers advanced tools and techniques in data analytics. Students will be taught how to apply and develop these skills in a range of business environments and will be able to contribute to all stages of developing solutions to analytical problems across multiple industries or domains. This unit has a focus on practical application using a variety of real-life case studies. Students gaining a grade of credit or higher in this unit are eligible for exemption from the Data Analytics Principles subject of the Actuary program of the Actuaries Institute.

## 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:** Explain the key iterative steps involved in building a model (business understanding, data understanding and preparation, modelling, evaluation, communication and deployment).

**ULO2:** Describe the various stages in data understanding and preparation and apply these skills within the context of practical problems.

**ULO3:** Compare predictive modelling techniques to select an appropriate method for a stated situation and perform predictive modelling for a given set of data.

**ULO4:** Use a range of perspectives (statistical techniques and measures, business context and objectives etc.) to evaluate the appropriateness of a model.

**ULO5:** Communicate modelling results to a range of business decision making audiences, taking into account the audience's needs and relating findings back to the original business objectives.

# General Assessment Information

**Late Assessment Submission Penalty (written assessments)**

Unless a Special Consideration request has been submitted and approved, a 5% penalty (of the total possible mark) will be applied each day a written assessment is not submitted, up until the 7th day (including weekends). After the 7th day, a grade of '0' will be awarded even if the assessment is submitted. Submission time for all written assessments is set at 11.55pm. A 1-hour grace period is provided to students who experience a technical concern.

For any late submissions of time-sensitive tasks, such as scheduled tests/exams, performance assessments/presentations, and/or scheduled practical assessments/labs, students need to submit an application for Special Consideration.

**Details of the assessments**

Details of the assessments, including the task question and rubrics, will be uploaded on iLearn. If there are any discrepancies between the unit guide and the detailed assessment documents on iLearn, the details in the assessment documents on iLearn should be the point of reference. It is the students responsibility to be aware of this and to contact the unit convenor if any clarifications are needed.

# Assessment Tasks

| Name | Weighting | Hurdle | Due |
|---|---|---|---|
| Project | 20% | No | Week 7 - See iLearn for details |
| Postgraduate student task | 0% | Yes | Week 8 - See iLearn for details |
| Case studies | 20% | No | Week 12 - See iLearn for details |
| Final Exam | 60% | No | University Examination Period |

## Project

Assessment Type [1]: Quantitative analysis task
Indicative Time on Task [2]: 20 hours
Due: **Week 7 - See iLearn for details**

Weighting: **20%**

Students will be required to write up a report (word limit of up to 5000 words) based on a project.

On successful completion you will be able to:
- Explain the key iterative steps involved in building a model (business understanding, data understanding and preparation, modelling, evaluation, communication and deployment).
- Describe the various stages in data understanding and preparation and apply these skills within the context of practical problems.
- Compare predictive modelling techniques to select an appropriate method for a stated situation and perform predictive modelling for a given set of data.
- Use a range of perspectives (statistical techniques and measures, business context and objectives etc.) to evaluate the appropriateness of a model.
- Communicate modelling results to a range of business decision making audiences, taking into account the audience's needs and relating findings back to the original business objectives.

# Postgraduate student task

Assessment Type [1]: Qualitative analysis task
Indicative Time on Task [2]: 2 hours
Due: **Week 8 - See iLearn for details**
Weighting: **0%**
**This is a hurdle assessment task (see assessment policy for more information on hurdle assessment tasks)**

Postgraduate (ACST8095 and ACST8095 External) students are required to complete a postgraduate student task, to be submitted via iLearn.

On successful completion you will be able to:
- Explain the key iterative steps involved in building a model (business understanding, data understanding and preparation, modelling, evaluation, communication and deployment).
- Describe the various stages in data understanding and preparation and apply these skills

within the context of practical problems.

- Compare predictive modelling techniques to select an appropriate method for a stated situation and perform predictive modelling for a given set of data.
- Use a range of perspectives (statistical techniques and measures, business context and objectives etc.) to evaluate the appropriateness of a model.
- Communicate modelling results to a range of business decision making audiences, taking into account the audience's needs and relating findings back to the original business objectives.

# Case studies

Assessment Type [1]: Case study/analysis
Indicative Time on Task [2]: 20 hours
Due: **Week 12 - See iLearn for details**
Weighting: **20%**

Students will work on two individual case studies.

On successful completion you will be able to:

- Explain the key iterative steps involved in building a model (business understanding, data understanding and preparation, modelling, evaluation, communication and deployment).
- Describe the various stages in data understanding and preparation and apply these skills within the context of practical problems.
- Compare predictive modelling techniques to select an appropriate method for a stated situation and perform predictive modelling for a given set of data.
- Use a range of perspectives (statistical techniques and measures, business context and objectives etc.) to evaluate the appropriateness of a model.
- Communicate modelling results to a range of business decision making audiences, taking into account the audience's needs and relating findings back to the original business objectives.

# Final Exam

Assessment Type [1]: Examination
Indicative Time on Task [2]: 28 hours
Due: **University Examination Period**
Weighting: **60%**

The final examination will be closed book, a three-hour written paper with ten minutes reading time, to be held during the University Examination period.

On successful completion you will be able to:

- Explain the key iterative steps involved in building a model (business understanding, data understanding and preparation, modelling, evaluation, communication and deployment).
- Describe the various stages in data understanding and preparation and apply these skills within the context of practical problems.
- Compare predictive modelling techniques to select an appropriate method for a stated situation and perform predictive modelling for a given set of data.
- Use a range of perspectives (statistical techniques and measures, business context and objectives etc.) to evaluate the appropriateness of a model.
- Communicate modelling results to a range of business decision making audiences, taking into account the audience's needs and relating findings back to the original business objectives.

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[1] 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.

[2] 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

**Classes**

ACST8095 is offered via classes in the North Ryde campus, Sydney CBD campus (of Macquarie University) and via distance education throughout the world. Students share lecture classes and a common teaching website with the units ACST4005 and ACST7095.

**Downloadable lecture recordings**

In all weeks, standard recordings of campus lectures using the University's lecture recording facility (ECHO360 or zoom) will be available. The recordings capture audio and screenshot. The recordings will either be provided via the ECHO360 link which is located on the right hand side of the webpage or via a zoom link.

**Timetable**

The timetable for classes can be found on the Macquarie University website at: Timetable 2022

Alterations to the class times or locations will be advised in class and on the teaching website.

**Teaching staff**

Maggie Lee is the unit convenor and will be taking five weeks of classes. Maggie can be contacted via Dialogue on the website, or during her consultation hours.

Professor Pavel Shevchenko will be taking the other weeks of classes. Pavel can be contacted via Dialogue on the website, or during his consultation hours.

Hong Xie is the teaching administrator, and can deal with any administrative queries related to the unit. Hong can be contacted via Dialogue on the website.

**Assumed knowledge**

We assume from the start of the Actuarial Data Analytics that you have acquired the knowledge and skills in subjects from the Foundation Program (Part 1s) of the Actuaries Institute education program.

**Lecture slides/Learning Guide**

There will be Lecture Slides and/or Learning Guides and associated readings for each section of work. You should read these materials in advance of the lectures, and bring a copy with you to classes.

**Technology Used and Required**

In this unit, you will need to have access to and to be able to use software to code (R and R studio) and word-processing software to produce reports.

**Teaching Website**

Course material is available on the online learning management system (iLearn). The teaching website is integral to this unit. Passive involvement in this unit greatly reduces the likelihood of achieving the exemption standard of understanding. Interaction with other students and with teachers is very important, and the website is the forum for that interaction. You will need to be accessing the website regularly to see announcements, read postings and stay informed - at least every couple of days. This is your responsibility and we cannot make any allowances for students who miss important information due to not checking the website regularly. The website entry page is at: http://ilearn.mq.edu.au

**Teaching and Learning Activities**

The unit is taught as set out in the Classes section. The Unit Schedule sets out the assessment and the topics covered in each week of the session.

**Exemptions**

The Macquarie University unit ACST4005/ACST7095/ACST8095 will satisfy the requirements for exemption from the Data Analytics Principles subject of the Actuary program of the Actuaries

Institute. You will be recommended for exemption if you attain grades of Credit or better in this unit. It is the responsibility of the student to apply to Macquarie University to recommend them to the Actuaries Institute for professional exemptions. For information about this process please contact Hong Xie via iLearn.

# Unit Schedule

| Week | Week beginning | Topic | Lecturer | Assessment task |
|------|---------------|-------|----------|-----------------|
| 1 | 25-Jul | Business Environment | ML | |
| 2 | 01-Aug | Communication | ML | |
| 3 | 08-Aug | Data exploration | ML | |
| 4 | 15-Aug | Data quality | ML | |
| 5 | 22-Aug | Data manipulation and cleansing | ML | |
| 6 | 29-Aug | Basic Concepts and Linear Regression | PS | |
| 7 | 05-Sep | Linear Regression II | PS | Project |
| Break | 12-Sep | | | |
| Break | 19-Sep | | | |
| 8 | 26-Sep | Model Selection | PS | Postgraduate Task |
| 9 | 03-Oct | GLM (Poisson Regression), clustering | PS | |
| 10 | 10-Oct | Regression Tree methods | PS | |
| 11 | 17-Oct | Classification | PS | |
| 12 | 24-Oct | Neural Networks and Generalised Additive Models | PS | Case Studies |
| 13 | 31-Oct | Mortality modelling using regression tree | PS | |

# Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central (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). 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) 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 or if you are a Global MBA student contact 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/.

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.