**THE UNIVERSITY OF SYDNEY**

# Current students

During 2021 we will continue to support students who need to study remotely due to the ongoing impacts of COVID-19 and travel restrictions. Make sure you check the location code when selecting a unit outline or choosing your units of study in Sydney Student. **Find out more about what these codes mean. [https://www.sydney.edu.au/students/selecting-units-in-sydney-student.html#codes]** Both remote and on-campus locations have the same learning activities and assessments, however teaching staff may vary. More information about face-to-face teaching and assessment arrangements for each unit will be provided on Canvas.

Unit of study_

# QBUS6850: Machine Learning for Business

## Overview                                                                     −

Machine Learning is a fundamental aspect of data analytics that automates analytical model building in modern business. In the big data era, managers are able to use very large and rich data sources and to make business decisions based on quantitative data analysis. Machine Learning covers a range of state-of-the-art methods/algorithms that iteratively learn from data, allowing computers to find hidden patterns and relationships in such data so as to support business decisions. This unit introduces modern machine learning techniques and builds skills in using data for everyday business decision making. Topics include: Machine Learning Foundation; Modern Regression Methods; Advanced Classification Techniques; Latent Variable Models; Support Vector Machines (SVM) and Kernel Methods; Artificial Neural Networks; Deep Learning; and Machine Learning for Big Data. Emphasis is placed on applications involving the analysis of business data. Students will practise applying machine learning algorithms to real-world datasets by using an appropriate computing package.

## Details

| Academic unit | Business Analytics |
|---|---|
| Unit code | QBUS6850 |
| Unit name | Machine Learning for Business |
| Session, year ? | Semester 1, 2022 |
| Attendance mode | Normal day |
| Location | Remote |
| Credit points | 6 |

## Enrolment rules

| Prohibitions ? | None |
|---|---|
| Prerequisites ? | QBUS6810 |
| Corequisites ? | None |
| Available to study abroad and exchange students | Yes |

## Teaching staff and contact details

| Coordinator | Junbin Gao, junbin.gao@sydney.edu.au |
|---|---|

## Assessment −

| Type | Description | Weight | Due | Length |
|---|---|---|---|---|
| **Final exam (Record+)** Ⓑ | **Final exam** n/a | 50% | Formal exam period | 2 hours |
| | Outcomes assessed: LO1 LO2 LO3 LO4 LO5 LO7 | | | |
| **In-semester test (Record+)** Ⓑ | **Mid-semester exam** n/a | 25% | Week 07 | 1.5 hours |
| | Outcomes assessed: LO1 LO2 LO3 LO4 LO5 LO7 | | | |

| Type | Description | Weight | Due | Length |
|---|---|---|---|---|
| **Assignment** 👥 | **Group project**<br>Computational analysis and written report | 25% | Week 13<br>**Due date**: 23 May 2022<br>**Closing date**: 30 May 2022 | details in the project document |
| | Outcomes assessed: <u>LO1 LO2 LO3 LO4 LO5 LO6 LO7</u> | | | |

| 👥 = group assignment | Ⓑ = Type B final exam | Ⓑ = Type B in-semester exam |
|---|---|---|
| ? | ? | ? |

**Group project:** This assignment will assess students ability to implement, evaluate and analyse machine learning models in an applied setting.

**Mid-semester exam:** This is a comprehensive exam that covers topics covered in the first half of the semester.

**Final exam:** This is a comprehensive exam that covers topics covered in the the semester.

Detailed information for each assessment can be found on Canvas.

## Assessment criteria

The University awards common result grades, set out in the <u>Coursework Policy 2014</u> (Schedule 1).

As a general guide, a high distinction indicates work of an exceptional standard, a distinction a very high standard, a credit a good standard, and a pass an acceptable standard.

| Result name | Mark range | Description |
|---|---|---|
| High distinction | 85 – 100 | Awarded when you demonstrate the learning outcomes for the unit at an exceptional standard, as defined by grade descriptors or exemplars outlined by your faculty or school. |
| Distinction | 75 – 84 | Awarded when you demonstrate the learning outcomes for the unit at a very high standard, as defined by grade descriptors or exemplars outlined by your faculty or school. |
| Credit | 65 – 74 | Awarded when you demonstrate the learning outcomes for the unit at a good standard, as defined by grade descriptors or exemplars outlined by your faculty or school. |
| Pass | 50 – 64 | Awarded when you demonstrate the learning outcomes for the unit at an acceptable standard, as defined by grade descriptors or exemplars outlined by your faculty or school. |

| Result name | Mark range | Description |
|---|---|---|
| Fail | 0 - 49 | When you don't meet the learning outcomes of the unit to a satisfactory standard. |

For more information see sydney.edu.au/students/guide-to-grades.

# Late submission

In accordance with University policy, these penalties apply when written work is submitted after 11:59pm on the due date:

- Deduction of **5%** of the maximum mark for each calendar day after the due date.
- After ten calendar days late, a mark of zero will be awarded.

# Special consideration

If you experience short-term circumstances beyond your control, such as illness, injury or misadventure or if you have essential commitments which impact your preparation or performance in an assessment, you may be eligible for special consideration or special arrangements.

# Academic integrity

The Current Student website provides information on academic honesty, academic dishonesty, and the resources available to all students.

The University expects students and staff to act ethically and honestly and will treat all allegations of academic dishonesty or plagiarism seriously.

We use similarity detection software to detect potential instances of plagiarism or other forms of academic dishonesty. If such matches indicate evidence of plagiarism or other forms of dishonesty, your teacher is required to report your work for further investigation.

# Weekly schedule　　　　　　　　　　　　　　　　　　　　−

| WK | Topic | Learning activity | Learning outcomes |
|---|---|---|---|

| WK | Topic | Learning activity | Learning outcomes |
|----|-------|-------------------|-------------------|
| Week 01 | Machine Learning Foundation | Lecture and tutorial (4 hr) | LO1 LO2 LO5 LO6 |
| Week 02 | Python Machine Learning | Lecture and tutorial (4 hr) | LO1 LO2 LO3 LO4 LO5 LO6 LO7 |
| Week 03 | Neural Networks I | Lecture and tutorial (4 hr) | LO1 LO2 LO3 LO4 LO5 LO6 LO7 |
| Week 04 | Neural Networks II | Lecture and tutorial (4 hr) | LO1 LO2 LO3 LO4 LO5 LO6 LO7 |
| Week 05 | Neural Networks III | Lecture and tutorial (4 hr) | LO1 LO2 LO3 LO4 LO5 LO6 LO7 |
| Week 06 | Neural Networks IV | Lecture and tutorial (4 hr) | LO1 LO2 LO3 LO4 LO5 LO6 LO7 |
| Week 07 | Mid-term Exam | Lecture and tutorial (2 hr) | LO1 LO2 LO3 LO4 LO5 LO6 LO7 |
| Week 08 | Graph Neural Networks | Lecture and tutorial (4 hr) | LO1 LO2 LO3 LO4 LO5 LO6 LO7 |
| Week 09 | Advanced Classification Techniques I | Lecture and tutorial (4 hr) | LO1 LO2 LO3 LO4 LO5 LO6 LO7 |
| Week 10 | Advanced Classification Techniques II | Lecture and tutorial (4 hr) | LO1 LO2 LO3 LO4 LO5 LO6 LO7 |
| Week 11 | Advanced Classification Techniques III | Lecture and tutorial (4 hr) | LO1 LO2 LO3 LO4 LO5 LO6 LO7 |
| Week 12 | Recommendation Systems | Lecture and tutorial (4 hr) | LO1 LO2 LO3 LO4 LO5 LO6 LO7 |
| Week 13 | Matrix Factorisation Techniques | Lecture and tutorial (4 hr) | LO1 LO2 LO3 LO4 LO5 LO6 LO7 |

# Attendance and class requirements

**Lecture recordings:** All lectures and seminars are recorded and will be available on Canvas for student use. Please note the Business School does not own the system and cannot guarantee that the system will operate or that every class will be recorded. Students should ensure they attend and participate in all classes.

# Study commitment

Typically, there is a minimum expectation of 1.5-2 hours of student effort per week per credit point for units of study offered over a full semester. For a 6 credit point unit, this equates to roughly 120-150 hours of student effort in total.

# Learning outcomes −

Learning outcomes are what students know, understand and are able to do on completion of a unit of study. They are aligned with the University's graduate qualities and are assessed as part of the curriculum.

At the completion of this unit, you should be able to:

**LO1**. understand the different types of learning algorithms and identify the advantages and limitations of each method
**LO2**. build a strong machine learning skill set for business decision making
**LO3**. create machine learning models for studying relationship amongst business variables
**LO4**. work with various data sets and identify problems within real-world constraints
**LO5**. demonstrate proficiency in the use of statistical software, e.g. Python, for machine learning models implementation
**LO6**. work productively and collaboratively in a team
**LO7**. present and write insights and suggestions effectively, professionally and ethically.

## Graduate qualities

The graduate qualities are the qualities and skills that all University of Sydney graduates must demonstrate on successful completion of an award course. As a future Sydney graduate, the set of qualities have been designed to equip you for the contemporary world.

| GQ1 | **Depth of disciplinary expertise**<br>Deep disciplinary expertise is the ability to integrate and rigorously apply knowledge, understanding and skills of a recognised discipline defined by scholarly activity, as well as familiarity with evolving practice of the discipline. |
|---|---|
| GQ2 | **Critical thinking and problem solving**<br>Critical thinking and problem solving are the questioning of ideas, evidence and assumptions in order to propose and evaluate hypotheses or alternative arguments before formulating a conclusion or a solution to an identified problem. |
| GQ3 | **Oral and written communication**<br>Effective communication, in both oral and written form, is the clear exchange of meaning in a manner that is appropriate to audience and context. |

| GQ4 | **Information and digital literacy**<br>Information and digital literacy is the ability to locate, interpret, evaluate, manage, adapt, integrate, create and convey information using appropriate resources, tools and strategies. |
|---|---|
| GQ5 | **Inventiveness**<br>Generating novel ideas and solutions. |
| GQ6 | **Cultural competence**<br>Cultural Competence is the ability to actively, ethically, respectfully, and successfully engage across and between cultures. In the Australian context, this includes and celebrates Aboriginal and Torres Strait Islander cultures, knowledge systems, and a mature understanding of contemporary issues. |
| GQ7 | **Interdisciplinary effectiveness**<br>Interdisciplinary effectiveness is the integration and synthesis of multiple viewpoints and practices, working effectively across disciplinary boundaries. |
| GQ8 | **Integrated professional, ethical, and personal identity**<br>An integrated professional, ethical and personal identity is understanding the interaction between one's personal and professional selves in an ethical context. |
| GQ9 | **Influence**<br>Engaging others in a process, idea or vision. |

## Outcome map

| Learning outcomes | Graduate qualities | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | GQ1 | GQ2 | GQ3 | GQ4 | GQ5 | GQ6 | GQ7 | GQ8 | GQ9 |

# Closing the loop                                      −

The order of modules have been made since this unit was last offered.

# Additional information                                −

- **Main Software:** Python is the main software to be utilised in this unit and is available in all the computer labs in the Business School Codrington Building (H69). You are encouraged to use your own computer/laptop. Please refer Canvas site of the unit on how to install the software.

- Business School Policies
- Maths in Business Workshops
- Peer-Assisted Study Sessions (PASS)

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## Key dates
Key dates through the academic year, including teaching periods, census, payment deadlines and exams.

## Student administration
Enrolment, course planning, fees, graduation, support services, student IT

## Expectations of student conduct
Code of Conduct for Students, Conditions of Enrollment, University Privacy Statement, Academic Integrity

## Academic appeals
Academic appeals process, special consideration, rules and guidelines, advice and support

## Learning and teaching policy
Policy register, policy search

## Financial support
Scholarships, interest free loans, bursaries, money management

## Study resources
Learning Centre, faculty and school programs, Library, online resources

## Health and support
Student Centre, counselling & psychological services, University Health Service, general health and wellbeing

# Disclaimer

**The University reserves the right to amend units of study or no longer offer certain units, including where there are low enrolment numbers.**

**This unit of study outline was last modified on 14 Jan 2022.**

To help you understand common terms that we use at the University, we offer an online glossary.

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