



UNSW Course Outline

AVIA3610 Aviation Data Modelling - 2024

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General Course Information

Course Code : AVIA3610

Year : 2024

Term : Term 3

Teaching Period : T3

Is a multi-term course? : No

Faculty : Faculty of Science

Academic Unit : School of Aviation

Delivery Mode : In Person

Delivery Format : Standard

Delivery Location : Kensington

Campus : Sydney

Study Level : Undergraduate

Units of Credit : 6

Useful Links

[Handbook Class Timetable](#)

Course Details & Outcomes

Course Description

Data modelling allows us to understand the relationship of various data within a system. In aviation, data modelling can be used in areas such as safety data analytics, aviation econometrics and sustainability to model and forecast scenarios to optimise processes and

understand how to improve systems. In this course, students will learn the various tools and techniques used to perform data modelling in the aviation industry and how to apply these to various challenges in an aviation context. This course will focus on data modelling with machine learning and neural network-based artificial intelligence (AI) models in aviation. Theories underpinning machine learning models and AI models will be covered in this course to provide students with theoretical knowledge about data modelling.

Tutorial sessions are an essential and significant part of this course. Data modelling projects are integral to this course, providing students with hands-on experience building data models and practising programming skills.

AVIA2601 or equivalent experience of the Python programming language is ideal for this course. For further enquiries related to equivalent Python experience, please contact the Course Authority.

Students are provided with Python programming training in tutorials to help them learn problem-solving skills in data preparation, exploration, and modelling.

Course Aims

The overall aim of this course is to enable students to develop machine learning and AI-based data models in aviation and gain further understanding of the background knowledge of data science theories and modern big data handling techniques in the aviation industry.

Relationship to Other Courses

This course follows AVIA2601 and focuses on neural network-based algorithms for data modelling. This course includes a capstone data project suitable for Stage-3 students.

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Conduct aviation data exploration and thoroughly analyse data with statistical analysis and visualisation tools.
CLO2 : Use programming skills to build machine learning-based data models in relevant aviation disciplines.
CLO3 : Use data modelling skills to develop artificial intelligence-based data models in relevant aviation disciplines.
CLO4 : Develop mathematical models to investigate business challenges and create effective solutions.

Course Learning Outcomes	Assessment Item
CLO1 : Conduct aviation data exploration and thoroughly analyse data with statistical analysis and visualisation tools.	• Data Project 1
CLO2 : Use programming skills to build machine learning-based data models in relevant aviation disciplines.	• Data Project 2
CLO3 : Use data modelling skills to develop artificial intelligence-based data models in relevant aviation disciplines.	• Data Project 3
CLO4 : Develop mathematical models to investigate business challenges and create effective solutions.	• Data Project 1 • Data Project 2 • Data Project 3

Learning and Teaching Technologies

Moodle - Learning Management System | Echo 360

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Data Project 1 Assessment Format: Individual	30%	Start Date: W1 Due Date: Week 4: 30 September - 06 October
Data Project 2 Assessment Format: Individual	30%	Start Date: W4 Due Date: Week 7: 21 October - 27 October
Data Project 3 Assessment Format: Individual	40%	Start Date: W7 Due Date: Week 11: 18 November - 24 November

Assessment Details

Data Project 1

Assessment Overview

Data Project 1 will require students to explore a large provided dataset, using Python to conduct the statistical analysis and utilising visualisation tools to generate business insights. Students are required to submit a 2,000-2,500 word report detailing and describing the business insights generated from the dataset. Students will be assessed on their ability to explore the data

using Python programming skills and proficiency in using visualisation tools to report on business insights. An assessment guide and marking rubric will be provided in week 1. This report is due by week 4, and feedback will be provided through Moodle within 10 working days after the submission deadline.

Course Learning Outcomes

- CL01 : Conduct aviation data exploration and thoroughly analyse data with statistical analysis and visualisation tools.
- CL04 : Develop mathematical models to investigate business challenges and create effective solutions.

Detailed Assessment Description

Please see the course Moodle page for more details.

Assessment Length

2,500 words

Submission notes

Please check the data project outline for details.

Assignment submission Turnitin type

This is not a Turnitin assignment

Generative AI Permission Level

Planning/Design Assistance

You are permitted to use generative AI tools, software or services to generate initial ideas, structures, or outlines. However, you must develop or edit those ideas to such a significant extent that what is submitted is your own work, i.e., what is generated by the tool, software or service should not be a part of your final submission. You should keep copies of your iterations to show your Course Authority if there is any uncertainty about the originality of your work.

If your Convenor has concerns that your answer contains passages of AI-generated text or media that have not been sufficiently modified you may be asked to explain your work, but we recognise that you are permitted to use AI generated text and media as a starting point and some traces may remain. If you are unable to satisfactorily demonstrate your understanding of your submission you may be referred to UNSW Conduct & Integrity Office for investigation for academic misconduct and possible penalties.

For more information on Generative AI and permitted use please see [here](#).

You are permitted to use AI tools to debug your Python codes or generate ideas. However, you

must develop or edit those ideas/codes to such a significant extent that what is submitted is your own work, i.e., what is generated by the tool, software or service should not be a part of your final submission.

Data Project 2

Assessment Overview

Data Project 2 will involve students exploring and solving industrial problems that emerged in Data Project 1 of the course by developing machine learning (ML) based models to gain insight and assist in decision-making. Students are required to write and submit a 2,000-2,500 word report communicating their approach, critical thinking, considerations for developing their models, and result discussions. An assessment guide and marking rubric will be provided in week 3. This report is due in Week 7, and feedback will be provided through Moodle within 10 working days after the submission deadline.

Course Learning Outcomes

- CL02 : Use programming skills to build machine learning-based data models in relevant aviation disciplines.
- CL04 : Develop mathematical models to investigate business challenges and create effective solutions.

Detailed Assessment Description

Please see the Moodle page for more details.

Assessment Length

2,500 words

Submission notes

Please see the project outline for details.

Assignment submission Turnitin type

This is not a Turnitin assignment

Generative AI Permission Level

Planning/Design Assistance

You are permitted to use generative AI tools, software or services to generate initial ideas, structures, or outlines. However, you must develop or edit those ideas to such a significant extent that what is submitted is your own work, i.e., what is generated by the tool, software or service should not be a part of your final submission. You should keep copies of your iterations to show

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Data Project 3

Assessment Overview

Data Project 3 allows students to develop artificial intelligence (AI)-based models and further explore business insights, such as time-series data modelling. For this assessment, students will be required to prepare and submit a 2,000-2,500 word report demonstrating their ability to synthesise and communicate knowledge of model development and skills to develop AI-based models for approaching different analysis targets and communicate the results of their analysis through visualisation skills. An assessment guide and marking rubric will be provided in week 7. This report is due in Study Week, and feedback will be provided through Moodle within 10 working days after the submission deadline.

Course Learning Outcomes

- CLO3 : Use data modelling skills to develop artificial intelligence-based data models in relevant aviation disciplines.
- CLO4 : Develop mathematical models to investigate business challenges and create effective solutions.

Detailed Assessment Description

Please refer to the Moodle course page for details.

Assessment Length

2,500 words

Submission notes

Please see the capstone project outline for details.

Assignment submission Turnitin type

This is not a Turnitin assignment

Generative AI Permission Level

Planning/Design Assistance

You are permitted to use generative AI tools, software or services to generate initial ideas, structures, or outlines. However, you must develop or edit those ideas to such a significant extent that what is submitted is your own work, i.e., what is generated by the tool, software or service should not be a part of your final submission. You should keep copies of your iterations to show your Course Authority if there is any uncertainty about the originality of your work.

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General Assessment Information

UNSW Aviation's decision for Short Extension Policy

The School of Aviation has carefully reviewed its range of assignments and projects to determine their suitability for automatic short extensions as set out by the UNSW Short Extension Policy. After careful consideration of our course offerings and our current structure, we have determined that our current deadline structures already accommodate the possibility of unexpected circumstances that may lead students to require additional days for submission. **Consequently, the School of Aviation has decided to not adopt the Short Extension provision for all its courses and has reassured that flexibility is integrated into our assessment**

deadlines. The decision is subject to revision in response to the introduction of new course offerings. Students may still apply for Special Consideration via the usual procedures.

Grading Basis

Standard

Course Schedule

Teaching Week/Module	Activity Type	Content
Week 1 : 9 September - 15 September	Blended	Course Introduction & Welcome 1- Introduction to ANN Data project walk-through
Week 2 : 16 September - 22 September	Blended	2- ANN & its Architecture
Week 3 : 23 September - 29 September	Blended	3- Backpropagation & Gradient Descent
Week 4 : 30 September - 6 October	Blended	4-ANN & Learning
Week 5 : 7 October - 13 October	Blended	5- RNN 6- LSTM
Week 6 : 14 October - 20 October	Project	Mid-term recharge week
Week 7 : 21 October - 27 October	Blended	Capstone Project Walk-Through
Week 8 : 28 October - 3 November	Blended	Capstone project consultation
Week 9 : 4 November - 10 November	Blended	Capstone project consultation
Week 10 : 11 November - 17 November	Blended	Capstone project consultation

Attendance Requirements

Please note that lecture recordings are not available for this course. Students are strongly encouraged to attend all classes and contact the Course Authority to make alternative arrangements for classes missed.

General Schedule Information

UNSW Aviation’s decision to not release Lecture Recordings

The School of Aviation prides itself on offering education that supports students in their personalised learning journey. This involves providing opportunities for students to engage with academics and key aviation experts to identify and address learning gaps, develop core skills and knowledge, and foster an environment of collaboration and meaningful discussion with the UNSW Aviation community. To support this vision, UNSW Aviation has decided to require students to attend all synchronous lectures (in-person or online) and not release class recordings to the student cohort. If students cannot attend a class and require learning support

due to unforeseen circumstances, they should contact their Course Coordinator or Program Coordinator to discuss options for support and making up for missed class time.

Course Resources

Prescribed Resources

Michael A. Nielsen, 2015. Neural Networks and Deep Learning, Determination Press. (<http://neuralnetworksanddeeplearning.com/index.html>).

Goodfellow, I., 2016. *Deep Learning*. MIT Press. (<https://www.deeplearningbook.org>).

Recommended Resources

VanderPlas, J., 2016. Python data science handbook: Essential tools for working with data. O'Reilly Media.

Tomasz Drabas, 2016. Practical data analysis cookbook. Birmingham, UK : Packt Publishing.

Course Evaluation and Development

The myExperience Survey aims to boost student feedback which creates a culture of continuous improvement by identifying, responding to, and acting on student feedback.

The course survey will open towards the end of Term. Students are encouraged to participate in the survey via Moodle, myUNSW, or through the direct myExperience link.

Please provide constructive feedback and focus on your learning experience in relation to the course material. While the survey is confidential, it is not anonymous. Comments that breach the Student Code of Conduct, that are hurtful, racist, sexist or ill natured, may lead to disciplinary action.

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	Cheng-Lung Wu					No	Yes
Lecturer	Tay Koo					No	No

Other Useful Information

Academic Information

Upon your enrolment at UNSW, you share responsibility with us for maintaining a safe, harmonious and tolerant University environment.

You are required to:

- Comply with the University's conditions of enrolment.
- Act responsibly, ethically, safely and with integrity.
- Observe standards of equity and respect in dealing with every member of the UNSW community.
- Engage in lawful behaviour.
- Use and care for University resources in a responsible and appropriate manner.
- Maintain the University's reputation and good standing.

For more information, visit the [UNSW Student Code of Conduct Website](#).

Academic Honesty and Plagiarism

Referencing is a way of acknowledging the sources of information that you use to research your assignments. You need to provide a reference whenever you draw on someone else's words, ideas or research. Not referencing other people's work can constitute plagiarism.

Further information about referencing styles can be located at <https://student.unsw.edu.au/referencing>

Academic integrity is fundamental to success at university. Academic integrity can be defined as a commitment to six fundamental values in academic pursuits: honesty, trust, fairness, respect, responsibility and courage. At UNSW, this means that your work must be your own, and others' ideas should be appropriately acknowledged. If you don't follow these rules, plagiarism may be detected in your work.

Further information about academic integrity, plagiarism and the use of AI in assessments can be located at:

- The [Current Students site](#),
- The [ELISE training site](#), and
- The [Use of AI for assessments](#) site.

The Student Conduct and Integrity Unit provides further resources to assist you to understand your conduct obligations as a student: <https://student.unsw.edu.au/conduct>

Submission of Assessment Tasks

Penalty for Late Submissions

UNSW has a standard late submission penalty of:

- 5% per day,
- for all assessments where a penalty applies,
- capped at five days (120 hours) from the assessment deadline, after which a student cannot submit an assessment, and
- no permitted variation.

Any variations to the above will be explicitly stated in the Course Outline for a given course or assessment task.

Students are expected to manage their time to meet deadlines and to request extensions as early as possible before the deadline.

Special Consideration

If circumstances prevent you from attending/completing an assessment task, you must officially apply for special consideration, usually within 3 days of the sitting date/due date. You can apply by logging onto myUNSW and following the link in the My Student Profile Tab. Medical documentation or other documentation explaining your absence must be submitted with your application. Once your application has been assessed, you will be contacted via your student email address to be advised of the official outcome and any actions that need to be taken from there. For more information about special consideration, please visit: <https://student.unsw.edu.au/special-consideration>

Important note: UNSW has a “fit to sit/submit” rule, which means that if you sit an exam or submit a piece of assessment, you are declaring yourself fit to do so and cannot later apply for Special Consideration. This is to ensure that if you feel unwell or are faced with significant circumstances beyond your control that affect your ability to study, you do not sit an examination or submit an assessment that does not reflect your best performance. Instead, you should apply for Special Consideration as soon as you realise you are not well enough or are otherwise unable to sit or submit an assessment.

Faculty-specific Information

Additional support for students

- [The Current Students Gateway](#)
- [Student Support](#)
- [Academic Skills and Support](#)
- [Student Wellbeing, Health and Safety](#)
- [Equitable Learning Services](#)
- [UNSW IT Service Centre](#)
- Science EDI Student [Initiatives](#), [Offerings](#) and [Guidelines](#)

School Contact Information

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