UNSW Course Outline

HDAT9510 Health Data Analytics: Machine Learning II - 2024

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General Course Information

Course Code : HDAT9510
Year : 2024
Term : Term 3
Teaching Period : T3
Is a multi-term course? : No
Faculty : Faculty of Medicine and Health
Academic Unit : School of Biomedical Sciences
Delivery Mode : Multimodal
Delivery Format : Standard
Delivery Location : Kensington
Campus : Sydney
Study Level : Postgraduate
Units of Credit : 6

Useful Links

[Handbook](#) [Class Timetable](#)

Course Details & Outcomes

Course Description

In this course, which builds upon a foundational understanding of machine learning, you will

learn the core theory and practical application of deep learning algorithms in the area of health.

Adopting a hands-on approach, the course is tailored to provide you with the essential skills and knowledge needed to effectively tackle and resolve healthcare data challenges using the deep learning algorithms covered in the course.

Course Aims

The aim of this course is to provide a solid foundational understanding in deep learning algorithms, specifically tailored for application in the field of health data.

Relationship to Other Courses

This course is an elective in the Health Data Science Program. It continues from HDAT9500: Machine Learning 1, building on the concepts and techniques learned in that course. Familiarity with the content of HDAT9500 is assumed, as this course focuses on deepening your understanding and applying advanced machine learning methods.

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Implement various cutting-edge machine learning algorithms
CLO2 : Formulate machine learning in a single health application system: research questions, data extraction, data preprocessing and visualisation, model selection, training and evaluation, hyper-parameter tuning, prediction, model explanation and interpretation, and deployment
CLO3 : Construct knowledge via the application of sophisticated machine learning techniques to real-world health data problems

Course Learning Outcomes	Assessment Item
CLO1 : Implement various cutting-edge machine learning algorithms	• Project 1 • Project 2
CLO2 : Formulate machine learning in a single health application system: research questions, data extraction, data preprocessing and visualisation, model selection, training and evaluation, hyper-parameter tuning, prediction, model explanation and interpretation, and deployment	• Project 1 • Project 2
CLO3 : Construct knowledge via the application of sophisticated machine learning techniques to real-world health data problems	• Project 1 • Project 2

Learning and Teaching Technologies

Open Learning | Microsoft Teams

Learning and Teaching in this course

All course materials and course announcements are provided on the course learning management system, Open Learning.

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Project 1 Assessment Format: Individual Short Extension: Yes (2 days)	60%	Start Date: Not Applicable Due Date: Week 5: 07 October - 13 October
Project 2 Assessment Format: Individual Short Extension: Yes (2 days)	40%	Start Date: Not Applicable Due Date: Week 11: 18 November - 24 November

Assessment Details
Project 1

Assessment Overview

This assignment requires you to solve small health data problems using machine learning techniques and produce a computer program with a short report. You will need to apply the machine learning workflow taught during the course, including data preprocessing, feature engineering, model selection, and evaluation, to successfully analyze and interpret health data. The goal is to demonstrate your understanding and ability to apply machine learning techniques to real-world health data problems.

Project 1 will cover content from weeks 1-6 of the course.

Course Learning Outcomes

- CLO1 : Implement various cutting-edge machine learning algorithms
- CLO2 : Formulate machine learning in a single health application system: research questions, data extraction, data preprocessing and visualisation, model selection, training and evaluation, hyper-parameter tuning, prediction, model explanation and interpretation, and deployment
- CLO3 : Construct knowledge via the application of sophisticated machine learning techniques to real-world health data problems

Detailed Assessment Description

Detailed information about this assessment will be provided on the course page

Submission notes

See 3. Submission of Assessment Tasks in the Other Useful Information tab of your course outline and refer to the course page for additional submission information.

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](#).

Project 2

Assessment Overview

This assignment involves solving health data problems using machine learning techniques, creating a program and a brief report. You will need to demonstrate your understanding and ability to effectively analyze health data, addressing real-world health data problems.

Project 2 will cover content from weeks 7-10 of the course.

Course Learning Outcomes

- CLO1 : Implement various cutting-edge machine learning algorithms
- CLO2 : Formulate machine learning in a single health application system: research questions, data extraction, data preprocessing and visualisation, model selection, training and evaluation, hyper-parameter tuning, prediction, model explanation and interpretation, and deployment
- CLO3 : Construct knowledge via the application of sophisticated machine learning techniques

to real-world health data problems

Detailed Assessment Description

Detailed information about this assessment will be provided on the course page

Submission notes

See 3. Submission of Assessment Tasks in the Other Useful Information tab of your course outline and refer to Moodle for additional submission information.

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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For more information on Generative AI and permitted use please see here.

General Assessment Information

Detailed instructions regarding assessments for this course are provided on the course Open Learning page.

For student information on results, grades, and guides to assessment see: https://student.unsw.edu.au/assessment

Grading Basis

Standard

<u>Requirements to pass course</u>

In order to pass this course students must achieve a composite grade of at least 50 out of 100.

Course Schedule

Teaching Week/Module	Activity Type	Content
Week 1 : 9 September - 15 September	Workshop	Artificial Neural Networks (ANNs)
Week 2 : 16 September - 22 September	Workshop	Representation Learning and Generative Learning
Week 3 : 23 September - 29 September	Workshop	Representation Learning and Generative Learning
Week 4 : 30 September - 6 October	Workshop	Representation Learning and Generative Learning
Week 5 : 7 October - 13 October	Homework	Due to Labour Day on October 7, there will be no session this week. However, you are still required to complete and submit Assignment 1 as homework for the week.
Week 6 : 14 October - 20 October	Workshop	Recurrent Neural Networks (RNNs): Components of an RNN
Week 7 : 21 October - 27 October	Workshop	Recurrent Neural Networks (RNNs): Long Short-Term Memory (LSTM)
Week 8 : 28 October - 3 November	Workshop	Attention and Transformer-based language models
Week 9 : 4 November - 10 November	Workshop	Attention and Transformer-based language models
Week 10 : 11 November - 17 November	Workshop	Attention and Transformer-based language models

Attendance Requirements

Students are strongly encouraged to attend all classes and review lecture recordings.

General Schedule Information

The times and locations of classes can be found on myUNSW under Class Timetable.

Course Resources

Prescribed Resources

1. eBook - availabe at the UNSW library:

- Title: HANDS-ON MACHINE LEARNING WITH SCIKIT-LEARN, KERAS, AND TENSORFLOW : concepts, tools, and techniques to build intelligent systems
- Author: Géron, Aurélien.
- Third edition.; Sebastopol, California : O'Reilly Media, Inc.; 2022

2. Course notes
3. Workshop slides

Recommended Resources

Recommended resources for this course are provided on the course Open Learning page.

Additional Costs

There are no additional costs associated with this course.

Course Evaluation and Development

Student feedback is taken seriously, and continual improvements are made to the course based, in part, on such feedback.

We use student feedback from myExperience surveys to develop and make improvements to the course each year. We do this by identifying areas of the course that require development from both the rating responses and written comments. Please spare a few minutes to complete the myExperience surveys for this course posted at the top of the Moodle page at the end of term.

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	Oscar Perez Concha					Yes	Yes

Other Useful Information

Academic Information

As a student of UNSW Medicine & Health you are expected to familiarise yourself with the contents of this course outline and the UNSW Student Code and policies and procedures related to your studies.

Student Code of Conduct

Throughout your time studying at UNSW Medicine & Health, you share a responsibility with us for maintaining a safe, harmonious and tolerant University environment. This includes within the courses you undertake during your degree and your interactions with the UNSW community, both on campus and online.

The UNSW Student Code of Conduct website provides a framework for the standard of conduct expected of UNSW students with respect to both academic integrity and your responsibility as a UNSW citizen.

Where the University believes a student may have breached the code, the University may take disciplinary action in accordance with the Student Misconduct Procedure.

The Student Conduct and Integrity Office provides further resources to assist you to understand your conduct obligations as a student at UNSW.

Academic Honesty and Plagarism

Academic integrity

UNSW has an ongoing commitment to fostering a culture of learning informed by academic integrity. All UNSW staff and students have a responsibility to adhere to the principle of academic integrity, and ethical scholarship of learning is fundamental to your success at UNSW Medicine & Health.

Plagiarism, contract cheating, and inappropriate use of generative AI undermine academic integrity and are not tolerated at UNSW. For more information see the Academic Integrity and Plagiarism toolkit.

In addition to the information you are required to review in your ELISE training, UNSW Medicine & Health strongly recommends that you complete the Working with Academic Integrity module before submitting your first assessment task.

Referencing

Referencing is a way of acknowledging the sources of information that you use to research your assignments. Preferred referencing styles vary among UNSW Medicine & Health disciplines, so check your course Learning Management System (e.g. Moodle or Open Learning) page for information on preferred referencing styles.

For further information on referencing support and styles, see the Current Student Referencing page.

Academic misconduct and plagiarism

At UNSW, academic misconduct is managed in accordance with the Student Misconduct Procedure. Allegations of plagiarism are generally handled according to the UNSW Plagiarism Management Procedure. Plagiarism is defined in the UNSW Plagiarism Policy and is not tolerated at UNSW.

Use of Generative AI and other tools in your assessment

UNSW has provided guiding statements for the use of Generative AI in assessments. This will differ, depending on the individual assessment task, your course requirements, and the course

stage within your program.

Your course convenor will outline if and how you can use Generative AI in each of your assessment tasks. Inappropriate use of generative AI is considered academic misconduct.

Options for the use of generative AI include: (1) no assistance (for invigilated assessments); (2) simple editing assistance; (3) drafting assistance; and (4) full assistance with attribution; and (5) Generative AI software-based assessments. See your individual assessment descriptions for the level of permitted use of generative AI for each task and see your course Moodle (or Open Learning) page for the full instructions on permitted use of generative AI in your assessment tasks for this course.

Instructions may include a requirement to submit the original generative AI responses, or drafts of your original work, or provide on request.

Submission of Assessment Tasks

Short extensions and special consideration

Short extension

UNSW has a short extension procedure for submission of assessment tasks. Not all tasks are eligible, and eligible tasks have a predetermined extension length. UNSW Medicine and Health have set School-level extension lengths for eligible assessment tasks. See your course assessment descriptions for more information.

Students must check the availability of a short extension in the individual assessment task information for their courses.

Short extensions do not require supporting documentation. They must be submitted through Special Consideration before the assessment task deadline. No late applications will be accepted.

Late penalties apply to submission of assessment tasks without approved extension.

Special consideration

In cases where illness, misadventure or other circumstances beyond your control will prevent you from submitting your assessment by the due date and you require an extension, you need to

formally apply for Special Consideration through myUNSW.

UNSW has a **Fit to Sit/Submit rule**, which means that by sitting or submitting an assessment on the scheduled assessment date, you are declaring that you are fit to do so and cannot later apply for Special Consideration. Examinations include centrally timetabled examinations and scheduled, timed examinations and tests managed by your School.

Important information relating to Short Extension and Special Consideration is available here, including eligibility for Special Consideration, circumstances where students with Equitable Learning Plans can apply for Short Extensions and Special Consideration, and the appeals process.

Examinations

Information about the conduct of examinations in your course is provided on your course Moodle page.

Timed online assessment tasks

If you experience a technical or connection problem during a timed online assessment, such as a timed quiz, you can apply for Special Consideration. To be eligible to apply you need to contact the Course Convenor and advise them of the issue immediately. You will need to submit an application for Special Consideration immediately, and upload screenshots, error messages or other evidence of the technical issue as supporting documentation. Additional information can be found on: https://student.unsw.edu.au/special-consideration

Other assessment tasks

Late submission of assessment tasks

UNSW has standard late submission penalties as outlined in the UNSW Assessment Implementation Procedure, with no permitted variation. All late assignments (unless extension or exemption previously agreed) will be penalised by 5% of the maximum mark per calendar day (including Saturday, Sunday and public holidays).

Late submissions penalties are capped at five calendar days (120 hours). This means that a student is not permitted to submit an assessment more than 5 calendar days (120 hours) after the due date for that assessment (unless extension or exemption previously agreed).

Failure to complete an assessment task

You are expected to complete all assessment tasks for your courses. In some courses, there will be a minimum pass mark required on a specific assessment task (a "hurdle task") due to the need to assure clinical competency.

Where a hurdle task is applicable, additional information is provided in the assessment information on your course Moodle page.

Feedback on assessments

Feedback on your performance in assessment tasks will be provided to you in a timely manner. For assessment tasks completed within the teaching period of a course, other than a final assessment, feedback will be provided within 10 working days of submission, under normal circumstances.

Feedback on continuous assessment tasks (e.g. laboratory and studio-based, workplace-based, weekly quizzes) will be provided prior to the midpoint of the course.

Any variation from the above information that is specific to an assessment task will be clearly indicated in the course and assessment information provided to you on your course Moodle (or Open Learning) page.

Faculty-specific Information

Additional support for students

The university offers a wide range of support services that are available for students. Here are some links for you to explore.

- The Current Students Gateway: https://student.unsw.edu.au

- Academic Skills and Support: https://student.unsw.edu.au/academic-skills

- Student support: https://www.student.unsw.edu.au/support

- Student Wellbeing, Health and Safety: https://student.unsw.edu.au/wellbeing

Mind Smart Guides are a series of mental health self-help resources designed to give you the

psychological flexibility, resilience and self-management skills you need to thrive at university and at work.

- Mind Smart Guides: https://student.unsw.edu.au/mindsmart

- Equitable Learning Services: https://student.unsw.edu.au/els

- Guide to studying online: https://www.student.unsw.edu.au/online-study

Most courses in UNSW Medicine & Health use Moodle as your Learning Management System. Guidance for using UNSW Moodle can be found on the Current Student page. Difficulties with Moodle should be logged with the IT Service Centre.

- Moodle Support: https://student.unsw.edu.au/moodle-support

The IT Service Desk is your central point of contact for assistance and support with remote and on-campus study.

- UNSW IT Service Centre: https://www.myit.unsw.edu.au/services/students

Course evaluation and development

At UNSW Medicine & Health, students take an active role in designing their courses and their overall student experience. We regularly seek feedback from students, and continuous improvements are made based on your input. Towards the end of the term, you will be asked to participate in the myExperience survey, which serves as a source of evaluative feedback from students. Your input to this quality enhancement process is valuable in helping us meet your learning needs and deliver an effective and enriching learning experience. Student responses are carefully considered, and the action taken to enhance educational quality is documented in the myFeedback Matters section of your Moodle (or Open Learning) course page.

School-specific Information

Laboratory or practical class safety.

For courses where there is a laboratory or practical-based component, students are required to wear the specified personal protective equipment (e.g., laboratory coat, covered shoes, safety glasses) indicated in the associated student risk assessments. The student risk assessments

will be provided on the course Moodle page and must be read and acknowledged prior to the class.

Master of Science in Health Data Science courses

Courses in the Master of Science in Health Data Science are hosted through Open Learning. Additional resources are available on the Health Data Science Student Hub.

School Contact Information

School guidelines on contacting staff:

Course questions

All questions related to course content should be posted on Moodle (or Open Learning) or as directed by your Course Convenor.

In cases where email communication with course convenors is necessary, we kindly request the following:

- Use your official email address for any correspondence with teaching staff.

- We expect a high standard of communication. All communication should avoid using short-hand or texting language.

- Include your full name, student ID, and your course code and name in all communication.

Our course convenors are expected to respond to emails during standard working hours of Monday to Friday, 9am-5pm.

Administrative questions

If you have an administrative question about your program of study at the School please submit your enquiry online at UNSW Ask Us.

Complaints and appeals

Student complaints and appeals: https://student.unsw.edu.au/complaints

If you have any grievances about your studies, we invite you to address these initially to the

Course Convenor. If the response does not meet your expectations, you may then contact:

School Grievance Officer, Prof Nick Di Girolamo ([n.digirolamo@unsw.edu.au)](n.digirolamo@unsw.edu.au)

Master of Science in Health Data Science programs: School Grievance Officer, Dr Sanja Lujic (s.lujic@unsw.edu.au)