UNSW Course Outline

HDAT9700 Health Data Analytics: Statistical Modelling II - 2024

Published on the 17 May 2024

General Course Information

Course Code : HDAT9700
Year : 2024
Term : Term 2
Teaching Period : T2
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

Sophisticated modelling techniques are essential for the analysis of real-world health data. Building on Health Data Analytics: Statistical Modelling I (HDAT9600), this course expands the statistical toolkit and broadens your understanding of relevant statistical approaches for the

analysis of realistically complex data structures and research questions. The course is aimed at those currently working or planning on working in health or a health-related field, and who are interested in applying advanced statistical methods to analyse complex data.

Topics covered in this course include multilevel models for hierarchical data; analysis of time series and longitudinal data; causal directed acyclic graphs (DAGs) and quasi-experimental approaches to inform causal analysis of observational data; and multiple imputation for missing values.

Content is delivered through a combination of online readings, expert guest lectures and practical hands-on tutorials. Statistical concepts are illustrated with a variety of health examples, and you will learn how to implement methods using leading statistical software.

Course Aims

This course builds on HDAT9600 Statistical Modelling I, aiming to equip you with an intuitive understanding of realistically complex modelling scenarios and applied experience of building and interpreting statistical models.

Relationship to Other Courses

For Health Data Science students, the formal prerequisites are HDAT9200 Statistical Foundations of Health Data Science and HDAT9600 Statisticall Modelling I

This course assumes that students are already proficient in fitting and interpreting Generalised Linear Models using R or a similar statistical analysis package (e.g. Stata/SAS/Python), at a level covered in HDAT9600 Statistical Modelling I.

Being able to manipulate and visualise data is an essential first step of modelling data, so it is preferrable if students are comfortable undertaking exploratory data analyses, for example to the degree covered in HDAT9800 Visualisation and Communication. HDAT9800 will also introduce students to the R Markdown and GitHub workflows used for the course assessments (see below).

Software

The course is delivered using R so prior experience with R programming is assumed.

Students will submit their assessments using R Markdown and GitHub so some familiarity with these workflows is preferrable but not essential. See the links below for getting started with

RMarkdown and GitHub

- https://rmarkdown.rstudio.com/lesson-1
- https://happygitwithr.com/

Assistance with progression checking:

If you are unsure how this course fits within your program, you can seek guidance on optimising your program structure from staff at the Nucleus Student Hub.

Progression plans for UNSW Medicine and Health programs can be found on the UNSW Medicine & Health website.

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Critique the relative merits of a range of statistical models for analysing health research data.
CLO2 : Construct statistical models with appropriate data structures to address distinct health research questions.
CLO3 : Compose code using appropriate statistical software to run a range of sophisticated analytic techniques.
CLO4 : Appraise model fit using a variety of model diagnostics.
CLO5 : Interpret the fitted model parameters from a range of statistical models.

Course Learning Outcomes	Assessment Item
CLO1 : Critique the relative merits of a range of statistical models for analysing health research data.	• Assignment 1 • Assignment 2 • Assignment 3
CLO2 : Construct statistical models with appropriate data structures to address distinct health research questions.	• Assignment 1 • Assignment 2 • Assignment 3
CLO3 : Compose code using appropriate statistical software to run a range of sophisticated analytic techniques.	• Assignment 1 • Assignment 2 • Assignment 3
CLO4 : Appraise model fit using a variety of model diagnostics.	• Assignment 1 • Assignment 2 • Assignment 3
CLO5 : Interpret the fitted model parameters from a range of statistical models.	• Assignment 1 • Assignment 2 • Assignment 3

Learning and Teaching Technologies

Microsoft Teams | GitHub Pages Course Website

Learning and Teaching in this course

All course materials are provided via the GitHub Pages Course Website. You will receive an invitation to this course in O week and will need to to authenticate using your Single Sign On details and a free GitHub account. All course announcements are provided via Teams.

By accessing and using the ICT resources provided by UNSW, you are agreeing to abide by the 'Acceptable Use of UNSW ICT Resources' policy particularly on respect for intellectual property and copyright, legal and ethical use of ICT resources and security and privacy.

Additional Course Information

Enroling in the course as an audit student

HDR students seeking approval to audit the course should email the course convenor to

1. Provide evidence of their experience fitting and interpreting linear models using R or other statistical software
2. CC their primary supervisor, and confirm their approval for the student to audit the course

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Assignment 1 Assessment Format: Individual Short Extension: Yes (2 days)	33.33%	Start Date: Not Applicable Due Date: 17/06/2024 09:00 AM
Assignment 2 Assessment Format: Individual Short Extension: Yes (2 days)	33.34%	Due Date: 15/07/2024 09:00 AM
Assignment 3 Assessment Format: Individual Short Extension: Yes (2 days)	33.33%	Due Date: 12/08/2024 09:00 AM

Assessment Details
Assignment 1

Assessment Overview

This assessment focuses on the topic of causal inference from observational data. In this task, due in the first part of the course, you will be provided with a dataset, and you will be required to fit an appropriate model to address one or more research questions. You will need to be able to choose the appropriate model to address the given research question and available data, to write correct code to fit and present the model results, and to identify and interpret the model parameters to answer the research question. You will also need to justify your choice of model and modelling decisions, while acknowledging relevant limitations. You will be provided with written feedback on your statistical code and interpretation, as well as a sample solution.

Course Learning Outcomes

- CLO1 : Critique the relative merits of a range of statistical models for analysing health research data.
- CLO2 : Construct statistical models with appropriate data structures to address distinct health research questions.
- CLO3 : Compose code using appropriate statistical software to run a range of sophisticated analytic techniques.
- CLO4 : Appraise model fit using a variety of model diagnostics.
- CLO5 : Interpret the fitted model parameters from a range of statistical models.

Assessment Length

Each assignment comprises 4-5 questions and a full submission usually runs to around 400 lines of code and text.

Submission notes

Solutions are submitted as RMarkdown-generated documents via GitHub

Assessment information

Detailed assessment description

Detailed information about this assessment will be provided in the assessment GitHub repo.

Extension

A short extension of 2 days is available for this task. See 3. Submission of Assessment Tasks in the Other Useful Information tab of your course outline.

Additional information

Use of Generative Artificial Intelligence (AI) in the assessment is permitted. This means that you may use AI-based software to research and prepare the coding and written parts of your assessment. Note that AI-derived code is frequently incorrect, and AI-derived text is typically generic, unhelpful or just plain wrong. Use these technologies wisely, as a handrail not a crutch.

Use of AI must be acknowledged in your assessment. Please refer to the UNSW referencing page for guidance on how to cite AI tools: https://www.student.unsw.edu.au/ai-referencing.

Assignment submission Turnitin type

This is not a Turnitin assignment

Assignment 2

Assessment Overview

This assessment focuses on the topic of multilevel modelling. In this task, due approximately mid-way through the course, you will be provided with a dataset and you will be required to fit an appropriate model to address one or more research questions. You will need to be able to choose the appropriate model to address the given research question and available data, to write correct code to fit and present the model results, and to identify and interpret the model parameters to answer the research question. You will also need to justify your choice of model and modelling decisions, while acknowledging relevant limitations. You will be provided with written feedback on your statistical code and interpretation, as well as a sample solution.

Course Learning Outcomes

- CLO1 : Critique the relative merits of a range of statistical models for analysing health research data.
- CLO2 : Construct statistical models with appropriate data structures to address distinct health research questions.
- CLO3 : Compose code using appropriate statistical software to run a range of sophisticated analytic techniques.
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- CLO5 : Interpret the fitted model parameters from a range of statistical models.

Submission notes

Submission via GitHub only

Assessment information

Detailed assessment description

Detailed information about this assessment will be provided in the assessment GitHub repo.

Extension

A short extension of 2 days is available for this task. See 3. Submission of Assessment Tasks in the Other Useful Information tab of your course outline.

Additional information

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Use of AI must be acknowledged in your assessment. Please refer to the UNSW referencing page for guidance on how to cite AI tools: https://www.student.unsw.edu.au/ai-referencing.

Assignment submission Turnitin type

Not Applicable

Assignment 3

Assessment Overview

This assessment focuses on the topic of time series analysis. In this task, due towards the end of the course, you will be provided with a dataset and you will be required to fit an appropriate model to address one or more research questions. You will need to be able to choose the appropriate model to address the given research question and available data, to write correct code to fit and present the model results, and to identify and interpret the model parameters to answer the research question. You will also need to justify your choice of model and modelling decisions, while acknowledging relevant limitations. You will be provided with written feedback on your statistical code and interpretation, as well as a sample solution.

Course Learning Outcomes

- CLO1 : Critique the relative merits of a range of statistical models for analysing health research data.
- CLO2 : Construct statistical models with appropriate data structures to address distinct health research questions.
- CLO3 : Compose code using appropriate statistical software to run a range of sophisticated analytic techniques.
- CLO4 : Appraise model fit using a variety of model diagnostics.

- CLO5 : Interpret the fitted model parameters from a range of statistical models.

<u>Submission notes</u>

Submission via GitHub only

<u>Assessment information</u>

Detailed assessment description

Detailed information about this assessment will be provided in the assessment GitHub repo.

Extension

A short extension of 2 days is available for this task. See 3. Submission of Assessment Tasks in the Other Useful Information tab of your course outline.

Additional information

Use of Generative Artificial Intelligence (AI) in the assessment is permitted. This means that you may use AI-based software to research and prepare the coding and written parts of your assessment. Note that AI-derived code is frequently incorrect, and AI-derived text is typically generic, unhelpful or just plain wrong. Use these technologies wisely, as a handrail not a crutch.

Use of AI must be acknowledged in your assessment. Please refer to the UNSW referencing page for guidance on how to cite AI tools: https://www.student.unsw.edu.au/ai-referencing.

<u>Assignment submission Turnitin type</u>

Not Applicable

General Assessment Information

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

<u>Grading Basis</u>

Standard

<u>Requirements to pass course</u>

Achieve a average mark of at least 50/100.

Course Schedule

Teaching Week/Module	Activity Type	Content
Week 0 : 20 May - 26 May	Other	Course website is opened.
Week 1 : 27 May - 2 June	Lecture	Directed Acyclic Graphs (DAGs)
Week 2 : 3 June - 9 June	Lecture	Matching for causal inference from observational data
Week 3 : 10 June - 16 June	Lecture	Multilevel modelling I (Introduction)
Week 4 : 17 June - 23 June	Lecture	Multilevel modelling II (Beyond the basics)
Week 5 : 24 June - 30 June	Lecture	Multilevel modelling III (Repeated measures analysis)
Week 6 : 1 July - 7 July	Other	Reading week (no new content - time to catch up on assigned readings and assessments).
Week 7 : 8 July - 14 July	Lecture	Time series analysis
Week 8 : 15 July - 21 July	Lecture	Interrupted time series analysis
Week 9 : 22 July - 28 July	Lecture	Missing data and multiple imputation
Week 10 : 29 July - 4 August	Lecture	Presenting and summarising model results

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.

The expected engagement for all UNSW 6UOC courses is 150 hours per term. This includes lectures, tutorials, readings, and completion of assessments and exam preparation (if relevant).

Course Resources

Prescribed Resources

Prescribed resources for this course are provided on the course website.

Recommended Resources

Recommended resources for this course are provided on the course website.

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 at the end of term.

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	Mark Hanly		CBDRH AGSM Level II	02 938 53143	By appointment	No	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 your assessment tasks. Options for the use of generative AI include: (1) no assistance; (2) simple editing assistance; (3) planning assistance; and (4) full assistance with attribution.

You may be required to submit the original generative AI responses, or drafts of your original work. Inappropriate use of generative AI is considered academic misconduct.

See your course Moodle (or Open Learning) page for the full instructions for individual assessment tasks for your course.

Submission of Assessment Tasks

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.

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

Examinations

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

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.

Recording of lectures, tutorials and other teaching activities (MSc. HDS only)

Lectures, tutorials and other teaching activities may be recorded. Students should be advised that they are consenting to the recording by their enrolment in the course or participation in the activity. The purpose of audio and video recordings is to enhance the student experience by supporting engaged learning in an online teaching environment and ensure equitable access to all course resources for our students. If you have concerns about accessing course recordings, or being recorded, please contact the Course Convenor.

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)

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