



UNSW Course Outline

MATH2831 Linear Models - 2024

Published on the 30 Aug 2024

General Course Information

Course Code : MATH2831

Year : 2024

Term : Term 3

Teaching Period : T3

Is a multi-term course? : No

Faculty : Faculty of Science

Academic Unit : School of Mathematics & Statistics

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

This course gives an understanding of the fundamentals of regression modelling, which is essential for anyone contemplating a career as a professional statistician or higher study in statistics for students majoring in mathematics and statistics.

Topics covered in the course include parameter estimation in linear models, model comparison using hypothesis testing, methods for selecting a good model when prediction of the response is the goal, detecting violations of model assumptions and identifying observations which have undue influence on decisions of interest.

The various components of the course (lectures, tutorials, computer labs, assignments) will improve the research and enquiry skills, as well as analytical thinking abilities of the students. Essential computing skills in relation to statistical analysis of data will also be developed.

Course Aims

This course introduces students to the theory of statistical model building using the important class of linear models. Concepts are illustrated with applications from finance, economics, medicine, environmental science and engineering. The course aims to develop statistical computing skills required for fitting linear models to data, analyzing results and making decisions of interest.

Linear models are a fundamental component of statistical practice, and the course provides a solid background for more advanced statistical courses.

Relationship to Other Courses

Prerequisite: MATH2801 or MATH2901

Exclusion: MATH2931

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Use key theoretical tools to explore properties of linear models.
CLO2 : Apply key methods of inference, model selection and diagnostics for linear models in applied settings.
CLO3 : Derive fundamental results in the theory of linear statistical models.
CLO4 : Apply core skills of statistical modeling in new contexts, such as finance, economics, engineering and medicine.

Course Learning Outcomes	Assessment Item
CLO1 : Use key theoretical tools to explore properties of linear models.	<ul style="list-style-type: none">• Assignment 1• Assignment 2• Assignment 3• Final exam
CLO2 : Apply key methods of inference, model selection and diagnostics for linear models in applied settings.	<ul style="list-style-type: none">• Assignment 1• Assignment 2• Assignment 3• Final exam
CLO3 : Derive fundamental results in the theory of linear statistical models.	<ul style="list-style-type: none">• Assignment 1• Assignment 2• Assignment 3• Final exam
CLO4 : Apply core skills of statistical modeling in new contexts, such as finance, economics, engineering and medicine.	<ul style="list-style-type: none">• Assignment 2• Assignment 3• Final exam

Learning and Teaching Technologies

Moodle - Learning Management System | Echo 360 | Mobius

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Assignment 1 Assessment Format: Group	15%	Start Date: Week 2 Due Date: Week 4
Assignment 2 Assessment Format: Group	15%	Start Date: Week 5 Due Date: Week 7
Assignment 3 Assessment Format: Group	15%	Start Date: Week 8 Due Date: Week 10
Final exam Assessment Format: Individual	55%	Start Date: See myUNSW for exam timetable

Assessment Details

Assignment 1

Assessment Overview

You will complete an assignment covering simple linear regression models, covered in the first two weeks of lectures. The assignment will be available in week 2 and is due in week 4.

One part of the assignment will require performing data analysis and answering numerical and short-answer questions. You will submit this task individually (50% of the task weighting).

Another part of the assignment (50% of the task weighting) will be submitted as group work. You will work on the questions as a group and write your responses jointly.

Feedback will be given within 2 weeks in the form of marks, comments and/or solutions.

Course Learning Outcomes

- CLO1 : Use key theoretical tools to explore properties of linear models.
- CLO2 : Apply key methods of inference, model selection and diagnostics for linear models in applied settings.
- CLO3 : Derive fundamental results in the theory of linear statistical models.

Assessment information

Standard late submission penalties apply.

Generative AI Permission Level

No Assistance

This assessment is designed for you to complete without the use of any generative AI. You are

not permitted to use any generative AI tools, software or service to search for or generate information or answers.

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

Assignment 2

Assessment Overview

You will complete a second assignment covering content on general linear models, delivered in lectures from weeks 3-5. The assignment will be available in week 5 and is due in week 7. One part of the assignment will require performing data analysis and answering numerical and short-answer questions. You will submit this task individually (50% of the task weighting).

Another part of the assignment (50% of the task weighting) will be submitted as group work. You will work on the questions as a group and write your responses jointly.

Feedback will be given within 2 weeks in the form of marks, comments and/or solutions.

Course Learning Outcomes

- CLO1 : Use key theoretical tools to explore properties of linear models.
- CLO2 : Apply key methods of inference, model selection and diagnostics for linear models in applied settings.
- CLO3 : Derive fundamental results in the theory of linear statistical models.
- CLO4 : Apply core skills of statistical modeling in new contexts, such as finance, economics, engineering and medicine.

Assessment information

Standard late submission penalties apply.

Generative AI Permission Level

No Assistance

This assessment is designed for you to complete without the use of any generative AI. You are not permitted to use any generative AI tools, software or service to search for or generate information or answers.

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Assignment 3

Assessment Overview

You will complete a third assignment covering content on model selection and diagnostics in linear models delivered in lectures from weeks 5-8. The assignment will be available in week 8

and is due in week 10.

One part of the assignment will require performing data analysis and answering numerical and short-answer questions. You will submit this task individually (50% of the task weighting).

Another part of the assignment (50% of the task weighting) will be submitted as group work. You will work on the questions as a group and write your responses jointly.

Feedback will be given within 2 weeks in the form of marks, comments and/or solutions.

Course Learning Outcomes

- CLO1 : Use key theoretical tools to explore properties of linear models.
- CLO2 : Apply key methods of inference, model selection and diagnostics for linear models in applied settings.
- CLO3 : Derive fundamental results in the theory of linear statistical models.
- CLO4 : Apply core skills of statistical modeling in new contexts, such as finance, economics, engineering and medicine.

Assessment information

Standard late submission penalties apply.

Generative AI Permission Level

No Assistance

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

Final exam

Assessment Overview

The final exam is 2 hours long and covers all material from lectures, tutorials, labs and assignments. The details will be confirmed during the course.

The examination will occur during the official university examination period.

Feedback is available through inquiry with the course convenor.

Course Learning Outcomes

- CLO1 : Use key theoretical tools to explore properties of linear models.
- CLO2 : Apply key methods of inference, model selection and diagnostics for linear models in applied settings.
- CLO3 : Derive fundamental results in the theory of linear statistical models.
- CLO4 : Apply core skills of statistical modeling in new contexts, such as finance, economics, engineering and medicine.

Generative AI Permission Level

No Assistance

This assessment is designed for you to complete without the use of any generative AI. You are not permitted to use any generative AI tools, software or service to search for or generate information or answers.

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

General Assessment Information

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.*

Grading Basis

Standard

Course Schedule

Teaching Week/Module	Activity Type	Content
Week 1 : 9 September - 15 September	Lecture	Simple Linear Regression Model
Week 2 : 16 September - 22 September	Lecture	Simple Linear Regression Model (continued)
Week 3 : 23 September - 29 September	Lecture	General Linear Model
Week 4 : 30 September - 6 October	Lecture	General Linear Model (continued)
Week 5 : 7 October - 13 October	Lecture	Model Selection
Week 6 : 14 October - 20 October	Other	No classes - flexibility week
Week 7 : 21 October - 27 October	Lecture	Model Selection (continued)
Week 8 : 28 October - 3 November	Lecture	Residuals and diagnostics
Week 9 : 4 November - 10 November	Lecture	Residuals and diagnostics (continued) Categorical predictors and interactions
Week 10 : 11 November - 17 November	Lecture	Categorical predictors and interactions (continued) Less than full rank models and other regression models

Attendance Requirements

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

Course Resources

Recommended Resources

Recommended Course Reading:

- ✉ MATH2831 Course Pack (pdf file available on Moodle)

Recommended Textbooks:

- ✉ Simon J. Sheather (2009) "A Modern Approach to Regression with R", Springer. [UNSW Bookshop Library](#) (eBook)
- ✉ G. James, D. Witten, T. Hastie & R. Tibshirani (2013) "An Introduction to Statistical Learning with Applications in R", Springer. [UNSW Bookshop Library](#) (eBook)
- ✉ A. J. Dobson & A. G. Barnett (2018) "An introduction to Generalised Linear Models", Fourth Edition, Chapman and Hall. [UNSW Bookshop Library](#) (eBook)
- ✉ DirkP. Kroese and Joshua C. C. Chan (2014) "Statistical Modeling and Computation", Springer. [UNSW Bookshop Library](#) (eBook)

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	Dr Dmytro Marushkevych		East Wing Anita B. Lawrence Centre, Room 411	0451899992	See Moodle for consultation hours	No	Yes

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-specific Information

School of Mathematics and Statistics and UNSW Policies

The School of Mathematics and Statistics has adopted a number of policies relating to enrolment, attendance, assessment, plagiarism, cheating, special consideration etc. These are in addition to the Policies of The University of New South Wales. Individual courses may also adopt other policies in addition to or replacing some of the School ones. These will be clearly notified in the Course Initial Handout and on the Course Home Pages on the Maths Stats web site. Students in courses run by the School of Mathematics and Statistics should be aware of the School and Course policies by reading the appropriate pages on the web site starting at: [The School of Mathematics and Statistics assessment policies](#)

The School of Mathematics and Statistics will assume that all its students have read and understood the School policies on the above pages and any individual course policies on the Course Initial Handout and Course Home Page. Lack of knowledge about a policy will not be an excuse for failing to follow the procedure in it.

Special Consideration - Short Extension Policy

The School of Mathematics and Statistics 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. Upon comprehensive examination of our course offerings that incorporate these types of assessments, we have concluded 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 Mathematics and Statistics has decided to universally opt out of the Short Extension provision for all its courses, having pre-emptively integrated flexibility 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.

Computing Lab

The main computing laboratory is room G012 of the Anita B.Lawrence Centre (formerly Red Centre). You can get to this lab by entering the building through the main entrance to the School of Mathematics (on the Mezzanine Level) and then going down the stairs to the Ground Level. A second smaller lab is Room M020, located on the mezzanine level through the glass door (and

along the corridor) opposite the School's entrance.

For more information, including opening hours, see the [computing facilities webpage](#). Remember that there will always be unscheduled periods when the computers are not working because of equipment problems and that this is not a valid excuse for not completing assessments on time.

School Contact Information

Please visit the [School of Mathematics and Statistics website](#) for a range of information.

For information on Courses, please go to "Student life & resources" and either Undergraduate and/or Postgraduate and respective "Undergraduate courses" and "Postgraduate courses" for information on all course offerings.

All school policies, forms and help for students can be located by going to the "Student Services" within "Student life & resources" page. We also post notices in "Student noticeboard" for your information. Please familiarise yourself with the information found in these locations. If you cannot find the answer to your queries on the web you are welcome to contact the Student Services Office directly.

Undergraduate

E: ug.mathsstats@unsw.edu.au

P: 9385 7011 or 9385 7053

Postgraduate

E: pg.mathsstats@unsw.edu.au

P: 9385 7053

Should we need to contact you, we will use your official UNSW email address of in the first instance. **It is your responsibility to regularly check your university email account. Please use your UNSW student email and state your student number in all emails to us.**