



UNSW Course Outline

DATA5002 Data Visualisation - 2024

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General Course Information

Course Code : DATA5002

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 : Postgraduate

Units of Credit : 6

Useful Links

[Handbook Class Timetable](#)

Course Details & Outcomes

Course Description

This course introduces students to data visualisation in the areas of statistical analysis and data science. Students will learn how to make their own effective and impactful visualisations using software tools including R. There will be a strong focus on developing the skill of data

storytelling: combining data, its visualisation, and a narrative to create a powerful story to drive change. Key topics include visualisation for exploratory and statistical data analysis and interactive visualisations such as dashboards. This course includes lectures and labs.

DATA5002 is a core course for the [Master of Data Science and Decisions \(8959\)](#), a prescribed elective for the [Quantitative Data Science honours \(MATHEH\)](#), and an elective for the [Master of Statistics \(8750\)](#).

Course Aims

The aim of this course is to provide students with the relevant knowledge to design and create their own effective visualisations using common software packages.

Course Learning Outcomes

Course Learning Outcomes
CL01 : Apply basic principles and concepts of data visualisation design.
CL02 : Produce appropriate high quality data visualisations using a variety of software packages and techniques.
CL03 : Critically evaluate and interpret data graphics, including understanding and interpreting the output of software packages.
CL04 : Apply data storytelling techniques to a range of problems in data science, statistics, and applications.
CL05 : Communicate data insights effectively and successfully to a variety of audiences. Successful communication can include accurately portraying insights, promoting understanding, or informing effective decisions.

Course Learning Outcomes	Assessment Item
CL01 : Apply basic principles and concepts of data visualisation design.	<ul style="list-style-type: none">• Weekly quizzes• Assignment 1• Project• Final Exam
CL02 : Produce appropriate high quality data visualisations using a variety of software packages and techniques.	<ul style="list-style-type: none">• Assignment 1• Project• Final Exam
CL03 : Critically evaluate and interpret data graphics, including understanding and interpreting the output of software packages.	<ul style="list-style-type: none">• Weekly quizzes• Assignment 1• Project• Final Exam
CL04 : Apply data storytelling techniques to a range of problems in data science, statistics, and applications.	<ul style="list-style-type: none">• Weekly quizzes• Assignment 1• Project• Final Exam
CL05 : Communicate data insights effectively and successfully to a variety of audiences. Successful communication can include accurately portraying insights, promoting understanding, or informing effective decisions.	<ul style="list-style-type: none">• Assignment 1• Project• Final Exam

Learning and Teaching Technologies

Moodle - Learning Management System | Blackboard Collaborate | Echo 360

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Weekly quizzes Assessment Format: Individual	10%	Start Date: Not Applicable Due Date: Weekly at start of lecture (Tuesday at noon)
Assignment 1 Assessment Format: Individual	15%	Start Date: 16/09/2024 12:00 AM Due Date: 02/10/2024 11:59 PM
Project Assessment Format: Individual	30%	Start Date: 07/10/2024 12:00 AM Due Date: 15/11/2024 11:59 PM
Final Exam Assessment Format: Individual	45%	Start Date: Not Applicable Due Date: During exam period

Assessment Details

Weekly quizzes

Assessment Overview

Before the start of the weekly lecture each week, you will complete a short multiple-choice Moodle quiz. The quiz will cover the assigned readings and other materials (available on Moodle) relevant to that week's lecture topics. When the quiz is closed, your mark and the correct answers will be provided.

There will be 9 quizzes (1 each week except for flexibility week), and they will be equally weighted, composing 10% of your final grade.

Course Learning Outcomes

- CL01 : Apply basic principles and concepts of data visualisation design.
- CL03 : Critically evaluate and interpret data graphics, including understanding and interpreting the output of software packages.
- CL04 : Apply data storytelling techniques to a range of problems in data science, statistics, and applications.

Detailed Assessment Description

Before the start of the weekly lecture each week, you will complete a short multiple-choice Moodle quiz. The quiz will cover the assigned readings and other materials (available on Moodle) relevant to that week's lecture topics. When the quiz is closed, your mark and the correct answers will be provided.

There will be 9 quizzes (1 each week except for flexibility week), and they will be equally weighted, composing 10% of your final grade.

Assessment information

For the weekly quizzes, no late quizzes will be accepted: you will receive a 0 on the quiz if you do not complete the quiz by the deadline, unless you have applied for and received special consideration. The quiz will automatically close on Moodle at the weekly deadline (Tuesday at noon).

Assignment submission Turnitin type

This is not a Turnitin assignment

Generative AI Permission Level

Not Applicable

Generative AI is not considered to be of assistance to you in completing this assessment. If you do use generative AI in completing this assessment, you should attribute its use.

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

Assignment 1

Assessment Overview

You will be given a series of problems in data visualisation. These may include: producing a visualisation of a provided dataset to accomplish a specified goal or to target a specified audience; interpreting a visualisation; and explaining your decisions in writing.

You will receive the assignment in week 2, and submit the assignment in week 4. You will receive individual written feedback.

Course Learning Outcomes

- CL01 : Apply basic principles and concepts of data visualisation design.
- CL02 : Produce appropriate high quality data visualisations using a variety of software packages and techniques.
- CL03 : Critically evaluate and interpret data graphics, including understanding and interpreting the output of software packages.
- CL04 : Apply data storytelling techniques to a range of problems in data science, statistics, and applications.
- CL05 : Communicate data insights effectively and successfully to a variety of audiences. Successful communication can include accurately portraying insights, promoting understanding, or informing effective decisions.

Detailed Assessment Description

You will be given a series of problems in data visualisation. These may include: producing a visualisation of a provided dataset to accomplish a specified goal or to target a specified audience; interpreting a visualisation; and explaining your decisions in writing.

You will receive the assignment in week 2, and submit the assignment in week 4. You will receive individual written feedback.

Assessment information

The standard policy for late submissions applies to this assignment.

Assignment submission Turnitin type

This assignment is submitted through Turnitin and students do not see Turnitin similarity reports.

Generative AI Permission Level

Simple Editing Assistance

In completing this assessment, you are permitted to use standard editing and referencing functions in the software you use to complete your assessment. These functions are described below. You must not use any functions that generate or paraphrase passages of text or other media, whether based on your own work or not.

If your Convenor has concerns that your submission contains passages of AI-generated text or media, you may be asked to account for your work. 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

Assessment Overview

You will choose a dataset, use appropriate software tools to produce visualisation(s), and write a report summarizing your choices and interpretation of the results. You will practice using terminology and reporting styles appropriately in a written summary.

You will receive the assignment in week 5, and submit the assignment in week 10. The final submission includes the graphic, relevant code, and a report of 1,000 words or less. You will receive individual written feedback.

Course Learning Outcomes

- CL01 : Apply basic principles and concepts of data visualisation design.
- CL02 : Produce appropriate high quality data visualisations using a variety of software packages and techniques.
- CL03 : Critically evaluate and interpret data graphics, including understanding and interpreting the output of software packages.
- CL04 : Apply data storytelling techniques to a range of problems in data science, statistics, and applications.
- CL05 : Communicate data insights effectively and successfully to a variety of audiences. Successful communication can include accurately portraying insights, promoting understanding, or informing effective decisions.

Detailed Assessment Description

You will choose a dataset, use appropriate software tools to produce visualisation(s), and write a report summarizing your choices and interpretation of the results. You will practice using terminology and reporting styles appropriately in a written summary.

You will receive the assignment in week 5, and submit the assignment in week 10. The final submission includes the graphic, relevant code, and a report of 1,000 words or less. You will receive individual written feedback.

Assessment Length

1,000 words or less

Assessment information

The standard policy for late submissions applies to the project.

Assignment submission Turnitin type

This assignment is submitted through Turnitin and students do not see Turnitin similarity reports.

Generative AI Permission Level

Assistance with Attribution

This assessment requires you to write/create a first iteration of your submission yourself. You are then permitted to use generative AI tools, software or services to improve your submission in the ways set out below.

Any output of generative AI tools, software or services that is used within your assessment must be attributed with full referencing.

If outputs of generative AI tools, software or services form part of your submission and are not appropriately attributed, your Convenor will determine whether the omission is significant. If so,

you may be asked to explain your submission. 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](#).

Final Exam

Assessment Overview

The final exam will be comprehensive and will test your knowledge of the lectures and labs throughout the course. The format will include multiple choice questions, short answer responses, and coding exercises.

Feedback for the final exam will be available through inquiry with the course convenor.

Course Learning Outcomes

- CLO1 : Apply basic principles and concepts of data visualisation design.
- CLO2 : Produce appropriate high quality data visualisations using a variety of software packages and techniques.
- CLO3 : Critically evaluate and interpret data graphics, including understanding and interpreting the output of software packages.
- CLO4 : Apply data storytelling techniques to a range of problems in data science, statistics, and applications.
- CLO5 : Communicate data insights effectively and successfully to a variety of audiences. Successful communication can include accurately portraying insights, promoting understanding, or informing effective decisions.

Detailed Assessment Description

The final exam will be comprehensive and will test your knowledge of the lectures and labs throughout the course. The format will include multiple choice questions, short answer responses, and coding exercises.

Feedback for the final exam will be available through inquiry with the course convenor.

Assessment Length

2 hours

Assignment submission Turnitin type

This is not a Turnitin assignment

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

The standard late submission policy applies to the assignment and project. For the weekly quizzes, no late quizzes will be accepted: you will receive a 0 on the quiz if you do not complete the quiz by the deadline, unless you have applied for and received special consideration.

Grading Basis

Standard

Course Schedule

Teaching Week/Module	Activity Type	Content
Week 1 : 9 September - 15 September	Lecture	Introduction to data visualisation; revision of R
	Laboratory	Data manipulation and baseline graphics in R
Week 2 : 16 September - 22 September	Lecture	Principles of data visualisation
	Laboratory	Data visualisation using ggplot2
Week 3 : 23 September - 29 September	Lecture	Visualisation for modeling
	Laboratory	Visualisation for modeling
Week 4 : 30 September - 6 October	Lecture	Visualisation for impact
	Laboratory	Visualisation for impact
Week 5 : 7 October - 13 October	Lecture	Techniques for large datasets and visual statistical inference
	Laboratory	Big-ish data, Geospatial data, Visual statistical inference
Week 6 : 14 October - 20 October	Lecture	Flexibility Week
Week 7 : 21 October - 27 October	Lecture	Interactive visualisation
	Laboratory	Interactive visualisation with htmlwidgets
Week 8 : 28 October - 3 November	Lecture	Dashboards
	Laboratory	Dashboards with shiny
Week 9 : 4 November - 10 November	Lecture	Tableau and special topics
	Laboratory	Introduction to Tableau, special topics
Week 10 : 11 November - 17 November	Lecture	Special topics
	Laboratory	Special topics

Attendance Requirements

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

General Schedule Information

Lectures and labs will be offered in-person and livestreamed. Students are encouraged to attend

all lectures and labs live. The lecture and one lab per week will also be recorded.

Note that the following schedule is tentative. In particular, since all of the labs are scheduled before the lecture, material may be moved to ensure that any lecture instruction and discussion required for a lab will precede that lab.

Course Resources

Recommended Resources

There is no required textbook for the course. However, the following online textbooks are useful resources, and parts of them will be referenced throughout the course.

- [Data visualization: A practical introduction](#) by Kieran Healy
- [Fundamentals of data visualistion](#) by Claus O. Wilke
- [R graphics cookbook](#) by Winston Chang
- [Data visualistion: From theory to practice](#) by James Baglin
- [R for data science](#) by Hadley Wickham and Garrett Grolemund

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	Pavel Krivitsky		Lawrence East (K-H13) Room 1032		By appointment.	Yes	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.**