



PSYM7718

Advanced Research Design and Statistics

Session 1, In person-scheduled-weekday, North Ryde 2024

School of Psychological Sciences

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Disclaimer

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General Information

Unit convenor and teaching staff
Unit Convenor, lecturer and tutor
Naomi Sweller
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Contact via Email
By appointment

Credit points
10

Prerequisites
Admission to MRes

Corequisites

Co-badged status
PSYH4418

Unit description
This unit is designed as preparation for the Master of Research projects and to help equip you for your research career. The unit focuses on practical issues of quantitative data analysis. Most topics are dealt with in the context of Stata. Topics include sample size and statistical power analysis, data management in Stata and more advanced methods specifically applicable to research in psychology.

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at <https://www.mq.edu.au/study/calendar-of-dates>

Learning Outcomes

On successful completion of this unit, you will be able to:

ULO1: Make connections between principles of good research design and relevant research questions, and correctly apply designs to the appropriate question.

ULO2: Demonstrate an understanding of how abstract concepts are operationalised in statistical terms in psychological research.

ULO3: Apply and interpret several advanced statistical methods to research in psychology.

ULO4: Demonstrate an enhanced practical understanding of statistical software used in psychological research, with a focus on understanding the syntax required to carry out analyses and interpreting output.

General Assessment Information

Grade descriptors and other information concerning grading are contained in the [Macquarie University Assessment Policy](#).

All final grades are determined by a grading committee, in accordance with the Macquarie University Assessment Policy, and are not the sole responsibility of the Unit Convenor.

Students will be awarded a final grade and a mark which must correspond to the grade descriptors specified in the [Assessment Procedure](#) (clause 128).

To pass this unit, you must demonstrate sufficient evidence of achievement of the learning outcomes, meet any ungraded requirements, and achieve a final mark of 50 or better.

Quiz

The Quiz is designed to give you feedback on your understanding of key concepts from the initial parts of the unit. The Quiz will be conducted through iLearn and will be a mixture of multiple choice and short answer questions. The Quiz is not timed, but all responses will be automatically submitted at the due time. No late submissions will be permitted unless special consideration has been granted. No further submissions will be accepted after the results are returned and feedback is released.

Research Evaluation Form information

The Research Evaluation Form is designed to help you with the process of planning your empirical project. It consists of a series of short answer questions, to which you will be required to write a response. Responses may include Stata syntax. The questions contained in the form will be made available in Week 1. All submissions are to be through Turnitin in iLearn.

Unless a Special Consideration request has been submitted and approved, a 5% penalty (OF THE TOTAL POSSIBLE MARK) will be applied each day a written assessment is not submitted, up until the 7th day (including weekends). After the 7th day, a grade of '0' will be awarded even if the assessment is submitted. Submission time for all written assessments is set at 11.55pm. A 1-hour grace period is provided to students who experience a technical concern.

For example:

Number of days (hours) late	Total Possible Marks	Deduction	Raw mark	Final mark
1 day (1-24 hours)	100	5	75	70
2 days (24-48 hours)	100	10	75	65
3 days (48-72 hours)	100	15	75	60

Number of days (hours) late	Total Possible Marks	Deduction	Raw mark	Final mark
7 days (144-168 hours)	100	35	75	40
>7 days (>168 hours)	100	-	75	0

For any late submissions of time-sensitive tasks, such as scheduled tests/exams, performance assessments/presentations, and/or scheduled practical assessments/labs, students need to submit an application for Special Consideration.

Final examination information

The final exam for this unit is currently scheduled to occur on Macquarie University campus. Students are expected to make themselves available for the final exam, in line with the Assessment Policy and Procedure.

This will be a 2-stage exam, with a team-work component. The exam will be a mixture of multiple choice and “fill in the blank” short answer questions. The procedure is such that you will first sit the exam individually, and then immediately afterwards in the same time slot you will do the exam again in groups of approximately four. The exams will then be graded such that 90% of the score comes from the individual attempt, and 10% from the group attempt, unless the individual attempt is better than the group attempt, in which case the student will get 100% of their score from the individual attempt.

The Unit Convenor will be allocating all students to groups. The group allocations will be posted to iLearn in the week prior to the exam. All allocations will be completely random and based on a random number generator.

If a student misses the exam due to illness or other unavoidable circumstances they can sit a supplementary exam which will contain only an individual component, with no group component. If a student has special circumstances such as the need for a longer testing time, they will sit the individual exam at the same time as the rest of the group, but they may start the exam earlier to enable them to finish the individual component with enough time to commence the group component with the rest of their group.

Students who are unable to sit an examination must submit an Application for Special Consideration form (supporting documentation from a medical or health care professional clearly stating the reasons for the absence from the exam must be attached to your submission). The only exception to not sitting an examination at the designated time is because of documented illness or unavoidable disruption. In these circumstances you may wish to consider applying for Special Consideration.

If a Supplementary Examination is granted as a result of the Special Consideration process, the examination will usually be held one week after the original examination date.

Supplementary Exams are only offered to students who have satisfactorily completed all other assessments for the unit and were unable to sit the final exam because of documented illness or unavoidable disruption.

You are advised that it is Macquarie University policy not to set early examinations for individuals or groups of students. All students are expected to ensure that they are available until the end of the teaching semester, which is the final day of the official examination period.

Illness or Significant Disruption to Assessments

In the event of illness or significant disruptions during an examination or timed assessment, students must promptly cease their work. If the incident occurs in a classroom setting, they must inform the supervisor or invigilator immediately. If the disruption takes place outside the classroom, it should be reported immediately to the appropriate course authority. Subsequently, students are required to submit an application for special consideration.

Students who have already submitted an assessment or participated in an examination or timed assessment without reporting any issues during the assessment process will only be considered for a second opportunity to undertake that assessment only under exceptional circumstances. The decision to grant a second opportunity will be evaluated on a case-by-case basis, with careful consideration given to the nature and validity of the exceptional circumstances that significantly affected their performance in the initial assessment. A statement of fact cannot suffice as evidence in such cases.

Assessment Tasks

Name	Weighting	Hurdle	Due
Research Evaluation form	35%	No	11:55pm Friday 12th April (Week 8)
Quiz	10%	No	11:55pm Friday 3rd May (Week 9)
Final examination	55%	No	In class Monday 27th May (Week 13)

Research Evaluation form

Assessment Type ¹: Plan

Indicative Time on Task ²: 44 hours

Due: **11:55pm Friday 12th April (Week 8)**

Weighting: **35%**

The Research Evaluation Form is designed to help you with the process of planning your empirical project. No word limit required.

On successful completion you will be able to:

- Make connections between principles of good research design and relevant research questions, and correctly apply designs to the appropriate question.
- Demonstrate an understanding of how abstract concepts are operationalised in statistical

terms in psychological research.

- Apply and interpret several advanced statistical methods to research in psychology.
- Demonstrate an enhanced practical understanding of statistical software used in psychological research, with a focus on understanding the syntax required to carry out analyses and interpreting output.

Quiz

Assessment Type ¹: Quiz/Test

Indicative Time on Task ²: 10 hours

Due: **11:55pm Friday 3rd May (Week 9)**

Weighting: **10%**

The quiz will be held online and will assess material covered in the early stages of the unit.

On successful completion you will be able to:

- Make connections between principles of good research design and relevant research questions, and correctly apply designs to the appropriate question.
- Demonstrate an understanding of how abstract concepts are operationalised in statistical terms in psychological research.
- Apply and interpret several advanced statistical methods to research in psychology.
- Demonstrate an enhanced practical understanding of statistical software used in psychological research, with a focus on understanding the syntax required to carry out analyses and interpreting output.

Final examination

Assessment Type ¹: Examination

Indicative Time on Task ²: 50 hours

Due: **In class Monday 27th May (Week 13)**

Weighting: **55%**

Final examination held in scheduled class time, in accordance with relevant requirements.

On successful completion you will be able to:

- Make connections between principles of good research design and relevant research questions, and correctly apply designs to the appropriate question.

- Demonstrate an understanding of how abstract concepts are operationalised in statistical terms in psychological research.
 - Apply and interpret several advanced statistical methods to research in psychology.
 - Demonstrate an enhanced practical understanding of statistical software used in psychological research, with a focus on understanding the syntax required to carry out analyses and interpreting output.
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¹ If you need help with your assignment, please contact:

- the academic teaching staff in your unit for guidance in understanding or completing this type of assessment
- the [Writing Centre](#) for academic skills support.

² Indicative time-on-task is an estimate of the time required for completion of the assessment task and is subject to individual variation

Delivery and Resources

As a student enrolled in this unit, you will engage in a range of online and face to face learning activities, including readings, videos and live Q&A sessions. Details can be found on the iLearn site for this unit.

Textbooks

There are two textbooks for this unit, both available through the Library:

Tabachnick, B., & Fidell, L. (2019). *Using Multivariate Statistics* (7th ed.). New York, NY: Pearson.

Keith, T. Z. (2019). *Multiple regression and beyond: an introduction to multiple regression and structural equation modeling* (3rd ed.). New York, NY: Routledge.

Please note that the previous editions of the textbooks will be acceptable for use in this unit. Page numbers may differ from those noted for the most recent editions, and you should check carefully with the library holdings of the prescribed editions that the content is equivalent.

Additional reading

There is an additional reading for the week on power and sample size:

Lachin, J. M. (1981). Introduction to sample size determination and power analysis for clinical trials. *Controlled Clinical Trials*, 2, 93-113.

Classes

Thirteen weeks: 12 x 2-hour lecture and 1-hour demonstration, with final examination held in the Week 13 lecture slot. The only exception to this is Week 7, where the scheduled class time falls on a public holiday. For that week, online recordings will be made available, and you may choose from one of two optional modules: 1) multi-level modelling or 2) qualitative research

methods. Please take whichever module is most of interest to you, or if you already have a thesis supervisor allocated, discuss with them which of those modules would be most beneficial for you to take.

Lectures will involve demonstrations of Stata procedures, using various examples. Students are encouraged to bring their own laptop with Stata installed, but this is not required. Theoretical issues will also be discussed during the lectures.

Practical exercises will be set each week for students to undertake in their own time. The following week there will be a demonstration session in addition to the lecture in which the lecturer will show (live) how they would approach the exercises. Students are encouraged to bring their own laptop computers to demonstration sessions to follow along. Questions are encouraged during this session in particular.

This version of the unit is “In person scheduled weekday”. Students should not attend on-campus classes if you are unwell or have any cold and flu-like symptoms. Ensure you follow the most recent University COVID-19 advice <https://www.mq.edu.au/about/coronavirus-faqs/information-for-students>

Technology Used

Active participation in the learning activities throughout the unit will require students to have access to a tablet, laptop or similar device. Students who do not own their own laptop computer may borrow one from the university library.

Unit Schedule

Week	Lecture topic	Required reading
1	Introduction to unit, Research Ethics, Data manipulation in Stata	TBA
2	Introduction to sample size and statistical power analysis	Tabachnick & Fidell, sections 1.5, 3.1.2. Lachin journal article
3	Interactions in regression (including categorical and continuous predictors)	Tabachnick & Fidell, section 5.6.6 Keith, Chapters 7 & 8
4	Advanced Logistic Regression #1	Keith, Chapter 11 (logistic regression section only) Tabachnick & Fidell, Chapter 10
5	Advanced Logistic Regression #2	Tabachnick & Fidell, Chapter 10
6	MANOVA	Tabachnick & Fidell, Chapter 7
7	Multi-Level Modelling OR Qualitative Research Methods	MLM: Tabachnick & Fidell, Chapter 15

8	Path Analyses with Regression	Keith, Chapters 12 &13 Tabachnick & Fidell, section 5.6.7
9	Path Analyses through SEM	Keith, Chapter 14 Tabachnick & Fidell, Chapter 14 (this chapter is optional and includes much more detail than needed)
10	Exploratory Factor Analysis #1	Tabachnick & Fidell, Chapter 13
11	Exploratory Factor Analysis #2	Tabachnick & Fidell, Chapter 13
12	Confirmatory Factor Analysis	Keith, Chapter 16
13	Final examination	

Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central \(https://policies.mq.edu.au\)](https://policies.mq.edu.au). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- [Academic Appeals Policy](#)
- [Academic Integrity Policy](#)
- [Academic Progression Policy](#)
- [Assessment Policy](#)
- [Fitness to Practice Procedure](#)
- [Assessment Procedure](#)
- [Complaints Resolution Procedure for Students and Members of the Public](#)
- [Special Consideration Policy](#)

Students seeking more policy resources can visit [Student Policies \(https://students.mq.edu.au/support/study/policies\)](https://students.mq.edu.au/support/study/policies). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

To find other policies relating to Teaching and Learning, visit [Policy Central \(https://policies.mq.edu.au\)](https://policies.mq.edu.au) and use the [search tool](#).

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: <https://students.mq.edu.au/admin/other-resources/student-conduct>

Results

Results published on platform other than [eStudent](#), (eg. iLearn, Coursera etc.) or released

directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in [eStudent](#). For more information visit ask.mq.edu.au or if you are a Global MBA student contact globalmba.support@mq.edu.au

Academic Integrity

At Macquarie, we believe [academic integrity](#) – honesty, respect, trust, responsibility, fairness and courage – is at the core of learning, teaching and research. We recognise that meeting the expectations required to complete your assessments can be challenging. So, we offer you a range of resources and services to help you reach your potential, including free [online writing and maths support](#), [academic skills development](#) and [wellbeing consultations](#).

Student Support

Macquarie University provides a range of support services for students. For details, visit <http://students.mq.edu.au/support/>

The Writing Centre

[The Writing Centre](#) provides resources to develop your English language proficiency, academic writing, and communication skills.

- [Workshops](#)
- [Chat with a WriteWISE peer writing leader](#)
- [Access StudyWISE](#)
- [Upload an assignment to Studiosity](#)
- [Complete the Academic Integrity Module](#)

The Library provides online and face to face support to help you find and use relevant information resources.

- [Subject and Research Guides](#)
- [Ask a Librarian](#)

Student Services and Support

Macquarie University offers a range of [Student Support Services](#) including:

- [IT Support](#)
- [Accessibility and disability support](#) with study
- Mental health [support](#)
- [Safety support](#) to respond to bullying, harassment, sexual harassment and sexual assault
- [Social support including information about finances, tenancy and legal issues](#)
- [Student Advocacy](#) provides independent advice on MQ policies, procedures, and

processes

Student Enquiries

Got a question? Ask us via [AskMQ](#), or contact [Service Connect](#).

IT Help

For help with University computer systems and technology, visit http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/.

When using the University's IT, you must adhere to the [Acceptable Use of IT Resources Policy](#). The policy applies to all who connect to the MQ network including students.

Inclusion and Diversity

Social inclusion at Macquarie University is about giving everyone who has the potential to benefit from higher education the opportunity to study at university, participate in campus life and flourish in their chosen field. The University has made significant moves to promote an equitable, diverse and exciting campus community for the benefit of staff and students. It is your responsibility to contribute towards the development of an inclusive culture and practice in the areas of learning and teaching, research, and service orientation and delivery. As a member of the Macquarie University community, you must not discriminate against or harass others based on their sex, gender, race, marital status, carers' responsibilities, disability, sexual orientation, age, political conviction or religious belief. All staff and students are expected to display appropriate behaviour that is conducive to a healthy learning environment for everyone.

Professionalism

In the Faculty of Medicine, Health and Human Sciences, professionalism is a key capability embedded in all our courses.

As part of developing professionalism, students are expected to attend all small group interactive sessions including clinical, practical, laboratory, work-integrated learning (e.g., PACE placements), and team-based learning activities. Some learning activities are recorded (e.g., face-to-face lectures), however you are encouraged to avoid relying upon such material as they do not recreate the whole learning experience and technical issues can and do occur. As an adult learner, we respect your decision to choose how you engage with your learning, but we would remind you that the learning opportunities we create for you have been done so to enable your success, and that by not engaging you may impact your ability to successfully complete this unit. We equally expect that you show respect for the academic staff who have worked hard to develop meaningful activities and prioritise your learning by communicating with them in advance if you are unable to attend a small group interactive session.

Another dimension of professionalism is having respect for your peers. It is the right of every student to learn in an environment that is free of disruption and distraction. Please arrive to all learning activities on time, and if you are unavoidably detained, please join activity as quietly as possible to minimise disruption. Phones and other electronic devices that produce noise and other distractions must be turned off prior to entering class. Where your own device (e.g., laptop)

is being used for class-related activities, you are asked to close down all other applications to avoid distraction to you and others. Please treat your fellow students with the utmost respect. If you are uncomfortable participating in any specific activity, please let the relevant academic know.

Unit information based on version 2024.01R of the [Handbook](#)