



# PSY 418

## Design and Statistics IV

S1 Day 2019

*Department of Psychology*

### Contents

<u>General Information</u>	2
<u>Learning Outcomes</u>	2
<u>General Assessment Information</u>	3
<u>Assessment Tasks</u>	4
<u>Delivery and Resources</u>	5
<u>Unit Schedule</u>	6
<u>Policies and Procedures</u>	7
<u>Graduate Capabilities</u>	9

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## General Information

Unit convenor and teaching staff

Lecturer and Convenor

Naomi Sweller

[naomi.sweller@mq.edu.au](mailto:naomi.sweller@mq.edu.au)

4 First Walk (C3A) 512

Alissa Beath

[alissa.beath@mq.edu.au](mailto:alissa.beath@mq.edu.au)

Credit points

3

Prerequisites

Corequisites

PSY490 or PSY495

Co-badged status

PSYC718

Unit description

This unit is designed as preparation for honours projects and to help equip students for research careers. The unit focuses on practical issues of quantitative data analysis. Most topics are dealt with in the context of SPSS. Topics include sample size and statistical power analysis, data management in SPSS 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:

- Understand how to calculate both prospective sample size requirements and retrospective:
  - a) Be able to estimate sample size needed for simple research designs
  - b) Be able to calculate statistical power available at the end of a study for simple research designs
- Understand the impact of several aspects of research design on sample size

requirements and statistical power. a) Between vs within-subject design b) Effects of between-subject variance and instrument responsiveness

Understand how abstract concepts are operationalised in statistical terms in psychological research.

Understand the application and interpretation of several advanced statistical methods applicable to research in psychology.

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

## **General Assessment Information**

### **Final examination information**

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 (following University guidelines that the supplementary exam does not need to be the same format as the original exam). If a student has special circumstances such as the need for an individual testing room, or a longer testing time, they will sit the individual exam at the same time as the rest of the group, but in their own room. They may start the exam earlier to enable them to finish the individual component with enough time to make their way to the group exam room to complete the group component of the assessment.

Students who are unable to sit an examination must advise the Honours administrator (Ms Donna Keeley, 9850 8113, [ask@mq.edu.au](mailto:ask@mq.edu.au)) and 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). All documentation must be submitted to Donna Keeley no later than 24 hours after the date of the exam. 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 be held one week after the original examination date. The format of a supplementary examination is at each unit convener's discretion and is subject to change from the original final examination.

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.

### **Research proposal form information**

Penalties will be levied for late submission of the assignment: Late submission of the research proposal will attract a penalty of 5% of the maximum mark for every day late. In other words, the assignment is worth 40%, so a penalty of  $5\% \times 40 = 2$  will be applied. 2 marks are subtracted from whatever the student received for the report for each day late.

Requests for extensions for assignments are granted by the Honours Administrator, Donna Keeley.

### Fit to sit model

Students who sit an exam and/or in-class test or otherwise submit an assessment, declare themselves fit to do so and will not be eligible to apply for special consideration unless there is evidence that (a) they were unfit to make reasonable judgement on their fitness to undertake the assessment, due to mental illness or other exceptional circumstances; or they were taken ill during the assessment (in the case of an examination or test), and this can be independently corroborated.

## Assessment Tasks

Name	Weighting	Hurdle	Due
<u>Final examination</u>	60%	No	Week 13
<u>Research Proposal Form</u>	40%	No	5pm Friday 3rd May

### Final examination

Due: **Week 13**

Weighting: **60%**

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 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.

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

On successful completion you will be able to:

- Understand how to calculate both prospective sample size requirements and retrospective: a) Be able to estimate sample size needed for simple research designs b) Be able to calculate statistical power available at the end of a study for simple research designs

- Understand the impact of several aspects of research design on sample size requirements and statistical power. a) Between vs within-subject design b) Effects of between-subject variance and instrument responsiveness
- Understand how abstract concepts are operationalised in statistical terms in psychological research.
- Understand the application and interpretation of several advanced statistical methods applicable to research in psychology.
- Gain an enhanced practical understanding of statistical software use in psychological research, with a focus on understanding the syntax required to carry out analyses and interpreting output.

## Research Proposal Form

Due: **5pm Friday 3rd May**

Weighting: **40%**

The Research Proposal 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 SPSS syntax. The questions contained in the form will be made available in Week 1. All submissions are to be through Turnitin in iLearn.

On successful completion you will be able to:

- Understand how abstract concepts are operationalised in statistical terms in psychological research.
- Understand the application and interpretation of several advanced statistical methods applicable to research in psychology.
- Gain an enhanced practical understanding of statistical software use in psychological research, with a focus on understanding the syntax required to carry out analyses and interpreting output.

## Delivery and Resources

### Required and recommended texts / materials

One required text:

- Field (2017). *Discovering Statistics Using IBM Statistics*. 5<sup>th</sup> edition. Sage.

Please note that the previous edition of the textbook (4<sup>th</sup> edition) will be perfectly acceptable for use in this unit. Page numbers may differ from those noted for the most recent version, but the content covered will be equivalent.

Two handbooks authored by Dr. Alan Taylor, both of which can be downloaded from iLearn:

- Introduction to IBM SPSS Statistics (“Intro”)
- Using the GLM Procedure in SPSS (“GLM”)

Two additional readings by Dr. Alan Taylor, also downloaded from iLearn:

- Taylor, A. Notes on Using the SPSS *manova* Procedure for Power Calculations
- Taylor, A. A Brief Introduction to Factor Analysis, which supplements Field Chapter 17.

Additional readings, available from the Library or from iLearn.

- Lachin, J.M. (1981). Introduction to sample size determination and power analysis for clinical trials. *Controlled Clinical Trials*, 2, 93-113.
- Chapters 10 and 14 from the textbook: Keith, T. (2006). Multiple regression and beyond. Allyn & Bacon: Boston.
- David Kenny's web page, <http://davidakenny.net/cm/mediate.htm>

## Classes

Thirteen weeks: 12 x 2-hour lecture and 1-hour demonstration, with final examination held in the Week 13 lecture slot.

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

While there will be Echo recordings, the lectures are designed for face-to-face format. Due to the interactive nature of the lectures in which students are encouraged to ask questions as we go, on occasion additional notes may be written on a whiteboard, or discussed verbally. There is no guarantee these will be captured by the recording. Further, if a recording fails, no replacement recordings will be uploaded as this unit is designed for internal mode only, with the assumption that students are able to attend classes.

The only exception to this is Week 13, which will be the final exam.

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.

Students are expected to complete readings prior to attending the lecture, and they are expected to participate in class discussions.

## Unit Schedule

Week by week list of topics

Week	Lecture Date	Lecture Topic	Reading
1	26 <sup>th</sup> February	Introduction to unit, reading data into SPSS and data manipulation	Intro 1-17, Field Chap 3
2	5 <sup>th</sup> March	Introduction to sample size and statistical power analysis	Field section 2.6.1.8 Lachin journal article + Notes on Using the SPSS manova Procedure for Power Calculations
3	12 <sup>th</sup> March	Interactions in GLM (including categorical and continuous predictors)	Field Chap 13 "GLM"
4	19 <sup>th</sup> March	Advanced Logistic Regression I	Field Chap 20
5	26 <sup>th</sup> March	Advanced Logistic Regression II	Field Chap 20
6	2 <sup>nd</sup> April	MANOVA #1	Field Chap 16
7	9 <sup>th</sup> April	MANOVA #2	Field Chap 16
Monday 15 <sup>th</sup> April – Friday 26 <sup>th</sup> April = mid-session break			
8	30 <sup>th</sup> April	Path Analyses with GLM / Regression	Keith Chap 10
9	7 <sup>th</sup> May	Path Analyses with AMOS	Field Chap 10
10	14 <sup>th</sup> May	Exploratory Factor Analysis #1	A Brief Introduction to Factor Analysis Field Chap 17
11	21 <sup>st</sup> May	Exploratory Factor Analysis #2	Field Chap 17
12	28 <sup>th</sup> May	Confirmatory factor analysis	Keith Chap 14
13	4 <sup>th</sup> June	Final examination	

## Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central \(https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central\)](https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central). 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](#)
- [Grade Appeal Policy](#)
- [Complaint Management Procedure for Students and Members of the Public](#)
- [Special Consideration Policy](#) (**Note:** *The Special Consideration Policy is effective from 4 December 2017 and replaces the Disruption to Studies Policy.*)

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

If you would like to see all the policies relevant to Learning and Teaching visit [Policy Central](http://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central) (<http://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central>).

## Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: <https://students.mq.edu.au/study/getting-started/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](http://ask.mq.edu.au) or if you are a Global MBA student contact [globalmba.support@mq.edu.au](mailto:globalmba.support@mq.edu.au)

## Student Support

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

## Learning Skills

Learning Skills ([mq.edu.au/learningskills](http://mq.edu.au/learningskills)) provides academic writing resources and study strategies to improve your marks and take control of your study.

- [Workshops](#)
- [StudyWise](#)
- [Academic Integrity Module for Students](#)
- [Ask a Learning Adviser](#)

## Student Services and Support

Students with a disability are encouraged to contact the [Disability Service](#) who can provide



appropriate help with any issues that arise during their studies.

## Student Enquiries

For all student enquiries, visit Student Connect at [ask.mq.edu.au](https://ask.mq.edu.au)

If you are a Global MBA student contact [globalmba.support@mq.edu.au](mailto:globalmba.support@mq.edu.au)

## IT Help

For help with University computer systems and technology, visit [http://www.mq.edu.au/about\\_us/offices\\_and\\_units/information\\_technology/help/](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.

## Graduate Capabilities

### Capable of Professional and Personal Judgement and Initiative

We want our graduates to have emotional intelligence and sound interpersonal skills and to demonstrate discernment and common sense in their professional and personal judgement. They will exercise initiative as needed. They will be capable of risk assessment, and be able to handle ambiguity and complexity, enabling them to be adaptable in diverse and changing environments.

This graduate capability is supported by:

### Learning outcomes

- Understand how to calculate both prospective sample size requirements and retrospective: a) Be able to estimate sample size needed for simple research designs b) Be able to calculate statistical power available at the end of a study for simple research designs
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- Understand how abstract concepts are operationalised in statistical terms in psychological research.
- Understand the application and interpretation of several advanced statistical methods applicable to research in psychology.
- Gain an enhanced practical understanding of statistical software use in psychological research, with a focus on understanding the syntax required to carry out analyses and interpreting output.

## Assessment tasks

- Final examination
- Research Proposal Form

## Discipline Specific Knowledge and Skills

Our graduates will take with them the intellectual development, depth and breadth of knowledge, scholarly understanding, and specific subject content in their chosen fields to make them competent and confident in their subject or profession. They will be able to demonstrate, where relevant, professional technical competence and meet professional standards. They will be able to articulate the structure of knowledge of their discipline, be able to adapt discipline-specific knowledge to novel situations, and be able to contribute from their discipline to inter-disciplinary solutions to problems.

This graduate capability is supported by:

## Learning outcomes

- Understand how to calculate both prospective sample size requirements and retrospective: a) Be able to estimate sample size needed for simple research designs b) Be able to calculate statistical power available at the end of a study for simple research designs
- Understand the impact of several aspects of research design on sample size requirements and statistical power. a) Between vs within-subject design b) Effects of between-subject variance and instrument responsiveness
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- Gain an enhanced practical understanding of statistical software use in psychological research, with a focus on understanding the syntax required to carry out analyses and interpreting output.

## Assessment tasks

- Final examination
- Research Proposal Form

## Critical, Analytical and Integrative Thinking

We want our graduates to be capable of reasoning, questioning and analysing, and to integrate and synthesise learning and knowledge from a range of sources and environments; to be able to critique constraints, assumptions and limitations; to be able to think independently and systemically in relation to scholarly activity, in the workplace, and in the world. We want them to

have a level of scientific and information technology literacy.

This graduate capability is supported by:

## **Learning outcomes**

- Understand how to calculate both prospective sample size requirements and retrospective: a) Be able to estimate sample size needed for simple research designs b) Be able to calculate statistical power available at the end of a study for simple research designs
- Understand the impact of several aspects of research design on sample size requirements and statistical power. a) Between vs within-subject design b) Effects of between-subject variance and instrument responsiveness
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## **Assessment tasks**

- Final examination
- Research Proposal Form

## **Problem Solving and Research Capability**

Our graduates should be capable of researching; of analysing, and interpreting and assessing data and information in various forms; of drawing connections across fields of knowledge; and they should be able to relate their knowledge to complex situations at work or in the world, in order to diagnose and solve problems. We want them to have the confidence to take the initiative in doing so, within an awareness of their own limitations.

This graduate capability is supported by:

## **Learning outcomes**

- Understand how to calculate both prospective sample size requirements and retrospective: a) Be able to estimate sample size needed for simple research designs b) Be able to calculate statistical power available at the end of a study for simple research designs
- Understand the impact of several aspects of research design on sample size requirements and statistical power. a) Between vs within-subject design b) Effects of

between-subject variance and instrument responsiveness

- Understand how abstract concepts are operationalised in statistical terms in psychological research.
- Understand the application and interpretation of several advanced statistical methods applicable to research in psychology.
- Gain an enhanced practical understanding of statistical software use in psychological research, with a focus on understanding the syntax required to carry out analyses and interpreting output.

## **Assessment tasks**

- Final examination
- Research Proposal Form

## **Effective Communication**

We want to develop in our students the ability to communicate and convey their views in forms effective with different audiences. We want our graduates to take with them the capability to read, listen, question, gather and evaluate information resources in a variety of formats, assess, write clearly, speak effectively, and to use visual communication and communication technologies as appropriate.

This graduate capability is supported by:

## **Learning outcomes**

- Understand how to calculate both prospective sample size requirements and retrospective: a) Be able to estimate sample size needed for simple research designs b) Be able to calculate statistical power available at the end of a study for simple research designs
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## **Assessment tasks**

- Final examination
- Research Proposal Form