



St Andrews University

PS5005: Methods of data analysis in psychology

Semester:	2
Class hours:	12-2, Mondays, Room 1.03, School of Psychology Optional help session: 2-3 Mondays, Room 1.03
Credits:	30
Timetabled hours:	22
Total commitment:	122 hrs
Assessment:	10 equally weighted assignments
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General Introduction

For M.Res. students, this module builds on the basic statistical training provided in the social science modules on quantitative and qualitative analysis (*SS5103 & SS5104*). For M.Sc. students the module is meant to enhance the understanding of statistics that you have gained from your undergraduate degree. The overarching goal of the module is to provide you with advanced training in the types of data analysis techniques employed commonly in psychological research. In this regard, the module will prepare you for understanding and critiquing psychological literature as well as undertaking your own high quality research..

AIMS

1. To reinforce the role that analysis should play during the design of psychological research
 2. To provide advanced training in analysis of variance, including factorial designs, post-hoc tests, planned comparisons, measures of effect size, repeated-measures and mixed designs and analysis of covariance
 3. To provide advance training in multivariate techniques, including multiple regression, cluster analysis, discriminant analysis, multi-dimensional scaling and structured equation modelling
 4. To provide an overview of the use of nonparametric data analysis
 5. To provide an overview of systematic reviewing of the scientific literature, including meta-analysis
 6. To give an overview of the problems associated with pseudoreplication and how to avoid them
 7. To provide an overview of the use of computer-intensive analyses, including Monte Carlo studies, bootstrapping, permutation tests and the use of neural networks in data analysis
 8. To provide advanced training in the use of statistical software (SPSS)
 9. To provide advanced training in psychological approaches to the qualitative analysis of discourse
 10. To examine case studies in which qualitative and quantitative research have been combined successfully
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LEARNING OUTCOMES

Students who perform well in this module will:

1. Demonstrate a *knowledge* of:
 - a. The role that considerations regarding data analysis must play in the design and planning of psychological research
 - b. Advanced techniques related to analysis of variance
 - c. Advanced statistics for use with categorical data
 - d. Common multivariate statistics
 - e. The process and measures used in meta-analysis of psychological research articles
 - f. Avoiding the pitfalls pseudoreplication
 - g. The potential benefits and pitfalls of combining qualitative and quantitative approaches
 - h. The potential of computer-intensive statistical techniques
 2. Have developed the following *skills*:
 - a. The ability to integrate plans for data analysis into research design
 - b. The ability to perform and interpret advanced quantitative analyses in SPSS
 - c. The ability to choose the appropriate qualitative method for a given psychological study
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MODULE STRUCTURE & ASSESSMENT

The modules will consist of 11 meetings, which will take place at 12-2PM on Mondays in room 1.03 of the School of Psychology. Approximately two-thirds of most meetings will be devoted to lectures, with the remaining one-third devoted to practical work and tutorials. The assessment in the module will be based on course work rather than tests. Additionally, we have booked the room for an optional hour after the session in case students would like to work on assignments or receive additional assistance.

The course work will consist of 10 exercises designed to assess your knowledge of the concepts and methods that are presented in the course. Each exercise will contribute equally to the final grade for the module. You are allowed to use any written source that you wish in order to complete them. In this regard, please read the University's policy on plagiarism and cite appropriately any sources that you use (see <http://www.st-andrews.ac.uk/pgstudents/academic/>). The continuous assessment should be completed by you independently, so please do *not* discuss the exercises with any other student.

SUPPORT

Many of the analytical techniques described in the module will be encountered for the first time by many students. Our aim is to make these novel procedures accessible without recourse to extensive discussions of the underlying mathematics. However, because of the advanced level of the training, it is important that students seek support as soon as any problem arises. If you have questions, then please ask them.

Eric Bowman, who is the module controller for the course, is also the School of Psychology's statistics tutor. As you are probably aware, he holds a "walk-in" statistics clinic for postgraduates in his office (Room 1.66 in the School of Psychology) from 10-11AM on Tuesdays and Thursdays. If you have questions about the material presented in this module, please see at these times or arrange an appointment (Dr. Bowman's telephone extension is x2093 and his e-mail is emb@st-and.ac.uk).

CRITERIA FOR ASSESSMENT

The University uses a universal grade point scale of 1-20, with the possibility to use one decimal point. The key reporting codes are:

- 0X No permission to proceed
- 1-4.9 Fail
- 5-20 Pass
- S Applies to a grade for a module affected by special circumstances

In order to gain automatic access to the dissertation, students must gain a credit-weighted average of 14 or above. Average grades of 12.0-13.9 allow access to the dissertation only at the discretion of the School, and require a credit-weighted average across taught modules and dissertation for at least 14.

The following Grade Scale is adopted in all module assessments:

- 16.5-20 Distinction: right of progression to Master's thesis (PS5002; PS5013)
- 13.5-16.4 Right of progression to Master's thesis (PS5002; PS5013)
- 12.0-13.4 Discretionary progression to Master's thesis (PS5002; PS5013)
- 5.0-11.9 Pass at postgraduate diploma level
- 1-4.9 Fail

As noted above, all of the assessment for the module will be from coursework rather than examinations. The criteria that will be used are listed below:

Mark	Explanation
16.5-20	Excellent work that indicates sophisticated understanding of the theory and practical application of the analytical methods presented in the module. The level of performance is clearly above that required for the M.Res. degree.
13.5-16.4	Very good work that indicates an thorough understanding most aspects of the theory and practical application of the analytical methods presented in the module. The level of performance is equal to that required for the M.Res. degree.
12.0-13.4	Good work that indicates good understanding of the theory and practical application of the analytical methods presented in the module. The level of performance approaches that required for the M.Res. degree.
5.0-11.9	Fair work that indicates a limited understanding of the theory and practical application of the analytical methods presented in the module. The level of performance is suitable for postgraduate credit but not for the M.Res. degree.
1-4.9	Flawed work that indicates either little understanding of the theory and practical application of the analytical methods presented in the module or incomplete work. The level of performance is below that required for postgraduate credit.

SCHEDULE

Meeting	Topics
1	Integrating the planning of data analysis with research design Unit of analysis and pseudoreplication Assignment: Planned analytical strategy for proposed Master's research Assignment: Description of unit of analysis in proposed Master's research Reading: Field, Chapters 1-5
2	Advanced one-way analysis of variance Assignment: Use of SPSS to calculate post-hoc tests and planned comparisons in one-way ANOVA Reading: Field, Chapters 9-10
3	Factorial analysis of variance Assignment: Interpretation of main effects and interactions in factorial ANOVA designs Reading: Field, Chapters 11-12
4	Repeated measures and mixed analysis of variance Assignment: The use of SPSS's diagnostic statistics and corrections for heterogeneity of variance in repeated measures designs Reading: Field, Chapters 13-14
5	Advanced multiple regression: diagnostic statistics, dummy variables and advanced designs Assignment: Diagnostic statistics for multiple regression in SPSS Reading: Field, Chapter 7

6	Multivariate techniques I: Overview of cluster analysis, discriminant analysis, principal component analysis and multidimensional scaling Assignment: Principal component analysis in SPSS Reading: Field, Chapter 17
7	Overview of nonparametric analyses Assignment: Logistic regression in SPSS Reading: Field, Chapters 8 & 15
8	Meta-analysis Computer-intensive methods statistical techniques Assignment: Loess regression Reading: Meta-analysis - http://www.psychwiki.com/wiki/Meta-analysis
9	Psychological approaches to the analysis of discourse
10	Combining qualitative and quantitative approaches in psychology Assignment: Case study of combining qualitative and quantitative approaches in psychology
11	Multivariate techniques II: Structured equation modelling

MODULE TEXTBOOK

Field, A. (2009) *Discovering Statistics Using SPSS*, 3rd Edition. London: Sage Publications Ltd. ISBN 978-1-84787-906-6 (hardback); 978-1-84787-907-3 (paperback).

Please note that Field's book is excellent in that it explains thoroughly the printout that SPSS creates routinely. However, there are sections in which Field's humour is a little crude, so be forewarned. Also, just because an expert takes a certain stance on a statistical issue in a textbook, one must always be aware that in statistics there are ongoing debates about best practice. The textbook has a companion web site at <http://www.sagepub.co.uk/field3e>.

STATISTICAL REFERENCES

- Breakwell, G.M., S.D. Hammond & C. Fife-Shaw (1995) *Research Methods in Psychology*. London: Sage Publications Ltd. ISBN 0 8039 7765 4 (paperback).
- Burton, D. (2000) *Research Training for Social Scientists: A Handbook for Postgraduate Researchers*. London: Sage Publications Ltd. ISBN 0 7619 6652 8 (paperback).
- Howell, D.C. (2007) *Statistical Methods for Psychology*. Belmont, CA: Thomson/Wadsworth. ISBN 0-495-01287-4 (student paperback).
- Keppel, G. & S. Zedek (1989) *Data Analysis for Research Designs: Analysis of Variance and Multiple Regression/Correlation Approaches*. New York: W. H. Freeman & Co. ISBN 0 7167 1991 6 (hardback).
- Siegel, S. & Castellan, N.J. (1988) *Nonparametric Statistics for the Behavioral Sciences* (2nd edition). New York: McGraw-Hill Book Co. ISBN 0 07 100326 6 (paperback).