Overview

Contact Details

<table>
<thead>
<tr>
<th>Office</th>
<th>email</th>
<th>Telephone</th>
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<tbody>
<tr>
<td>Peter Foldiak:  Rm 2.08</td>
<td><a href="mailto:pf2@st-andrews.ac.uk">pf2@st-andrews.ac.uk</a></td>
<td>(46)2087</td>
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<td>Paul Gardner:  Rm 1.01</td>
<td><a href="mailto:plg@st-andrews.ac.uk">plg@st-andrews.ac.uk</a></td>
<td>(46)2075</td>
</tr>
</tbody>
</table>

Peter has office hours from 12.00-1.00 on Mondays and Paul 9.00-12.00 on Fridays. If you are having difficulties or concerns about the module, email to schedule a meeting. Please let Peter/Paul know if these times aren’t suitable and email to arrange a mutually convenient time.

Timetable

<table>
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<tr>
<th>Week Date Lecture, Mondays 9:10-10:50</th>
<th>Practical, Monday 2-5</th>
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<tbody>
<tr>
<td>Jan 27 Introduction, overview &amp; feedback on PS3021</td>
<td>Practical session overview Science fair: Group formation &amp; discussion Science Fair Poster &amp; practical</td>
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<tr>
<td>Feb 3 ANOVA to ANCOVA</td>
<td>Science Fair: Preparation of materials. Readying the experiment individual project: Designing &amp; running</td>
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<tr>
<td>Feb 10 Multiple linear regression</td>
<td>Science Fair: Preparation of poster Research Plan Upload 21st February, 17.00</td>
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<tr>
<td>17th Feb Logistic regression</td>
<td>Science Fair:</td>
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<tr>
<td>Feb 24 Cluster analysis</td>
<td>Science Fair: Final preparation Ethics Upload 7th March, 17.00</td>
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<tr>
<td>March 3 MANOVA &amp; Discriminant factor analysis</td>
<td>Readying the experiment &amp; data collection</td>
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<td>March 10 PCA and factor analysis</td>
<td>March 8th (Saturday) Science Fair</td>
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<td>March 17</td>
<td>Easter Vacation</td>
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<tr>
<td>March 31</td>
<td>Data collection Individual analysis Data collection Individual running your own experiment Science Fair Report Upload 8th April, 17.00</td>
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<tr>
<td>April 7 Probability theory</td>
<td>Data collection, analysis &amp; writing</td>
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<td>April 14 Bayesian Methods</td>
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<tr>
<td>April 21 Revision lecture</td>
<td>Revision session Lab Report Upload 25th April, 17.00</td>
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The Computer Rooms, 1.02/1.03 are free most of the week and particularly Wednesday afternoons, 2-5.

**PS3022 Assessment**

40% of the final module grade and is based on the continuous assessment, 60% is based on the examination. Failure to pass both the continuous assessment and the examination will result in a module grade no higher than 6.9.

**Continuous assessment details**

20% of the CA grade: Individual Science fair report

The science fair report has a total word limit of 1000. This is a New Scientist style report (Paul leaves copies in the Foyer every week) on the phenomenon that you have exhibited and should be understandable by an intelligent member of the public. Pictures and other graphics are always well-received. Please note total word limit means all words in the report (but excludes references).

All text must be at least 12 point. This includes headings, figure legends, references, any appendices and any other text. Please note all text has no exceptions.

All paragraphs must be at least 1.5 spaced. Titles, headings, figure legends, references, appendices, the main text and any other paragraphs you include. Please note all paragraphs has no exceptions.

80% of the CA grade: Individual experiment

Each student is to design, implement, run, analyse and report their own, independent experiment. You must upload a final report, ethical application forms and the raw data files to MMS.

**Word limit**

The final report has a total word limit of 1500. This includes the abstract, the introduction, the results, the discussion. It does not include references, appendices numbers in tables, etc. However, putting details in appendices should be done with care: appendices are *not* part of the main report and as such cannot gain marks or be used in but that detail is in my report appeals 1500 words for the abstract introduction, methods, results & discussion should be more than sufficient to describe your study. If you find you are using more than 1500 words, think carefully about the relevance of what you are saying rather than trying to say the same amount in as few words as possible.

**Other files to upload**

The ethics forms and associated information should not be included in your report, other than noting that the study had ethical approval. However, you should upload the final version of ALL the forms, including any questionnaires, word lists etc. Remember,
however, that these files are not part of the report per se, so you may still need to provide example questions in your report.

Do not include the raw output from SPSS (or other programmes) in the written report: it is the summary of the statistical analyses that is needed in the report.

Consent forms. Please keep the completed consent forms for data protection reasons.

Formatting
Use either Times new roman, Arial or Calibri font. Do not use variants of these fonts (e.g. Arial narrow).

All text must be at least 12 point. This includes headings, figure legends, references, the abstract, any appendices and any other text. Please note all text has no exceptions.

All paragraphs must be at least 1.5 spaced. Titles, headings, figure legends, references, appendices, the main text and any other paragraphs you include. Please note all paragraphs has no exceptions.

Criteria for the continuous assessment

Science Festival report

We have been involved in National Science and Engineering Week for about 15 years. Along with the other Schools in the Science Faculty we create interactive displays for the general public. Your report should be an engaging New Scientist style article that explains the phenomenon that you have demonstrated which would be understandable to an educated lay reader. I will provide examples from previous years when we meet at our first session via Moodle. The marking criteria are those that we use for any standard JH module essay but bear in mind the aim of the assignment. It should not be just a dense list of references to other people’s work in the area otherwise your reader would give up!

Individual experiment report

Overview of criteria

The criteria for experimental reports ŕ regardless of length ŕ are the same as those used in the first and second years and PS3021 (see notes for PS1001, PS1002, PS2001, PS2002, PS3021). As with the transition from 1st to 2nd year, the expected standard increases moving from 2nd to 3rd year and indeed for first to second semester. Structure each section carefully so as to lead the reader through what will ŕ for them ŕ be unknown terrain.

While we use a relatively strict format for sub-honours, we do not for honours. As you will have noted from reading papers from different sources and journals, there is a whole range of styles, each with advantages and disadvantages. Thus, other than the abstract, introduction, methods, results & discussion, we do not require the use of the
other subheadings used at sub-honours. However, the content in sub-honours (participants, procedure etc) should be included even if the content is not under its own sub-heading.

**Specific guidance**

The title must relate to the IV/DV, and should ideally give the main result.

Context, including the "gap" that you have identified, should be clear. Try to give details of the theoretical context and relate your hypotheses to the (theoretical) context.

At a minimum, it should be possible to replicate your study on the basis of your description of the procedure (replicate, not approximate). Explain why you have chosen your DV and the IV's (including control variables). Give details about participants (number, sampling strategy etc). Justify the analysis method and give details, not simply describe it (i.e. relate to the hypotheses).

Work on your figures and tables. Carefully select which figures you going to show – which means careful selection of which figures you are not going to show. Decide on what information can go into the figure legends, what needs to be in the main text. Don't forget to describe the pattern of results (and relegate the statistical reporting to parenthetic comments) in the main text.

We expect the summary of results in the discussion to relate to the theoretical/experimental issues, and should not be a repeat of the results per se. Carefully select which aspects of previous studies/ideas are the most relevant to your findings and selectively expand on these. Give consideration to limitations of your study. Make sure that any further work will be doable and, ideally, offer further insight into clearly identified issues.

**Examination details**

60% of the module grade comes from the examination. The examination consists of two sections.
Section A "write a brief essay" type questions. Section B consists of short answers.
For section A you have to answer 1 question out of two.
In section B you will have to answer 10 out of 15 questions.

I do not expect you to know formulae. You will not be asked to do calculations etc. Short answer questions are meant to have short answers. Think about you answer before starting writing. You should be able to write a thorough answer in no more than 2 minutes. 3 or 4 sentences will typically be enough. If you’re writing 5 or 6 sentences it is probably too long. You can use bullet points rather than sentences.
Section A (30% of examination grade: suggested time 35 minutes)

Section A: Assess your in depth knowledge of research methodology by asking for details of analysis methods. For example,

Distinguish between logistic regression and multiple linear regression. Illustrate your answer with appropriate examples.

Distinguish between ANOVA and MANOVA. Illustrate your answer with appropriate examples.

Section B (70% of examination grade: suggested time 85 minutes)

Section B: Answer 10 out of 15 short answer questions, designed to check your breadth of knowledge across the module. For example,

Why should care be taken before using accuracy as a predictor in multiple linear regression?

How, with a single predictor variable, can you perform curvilinear regression?

What does Mauchly's test evaluate and when is it used?

In a 1-way ANOVA, what is the expected value of the variance ratio F when the null hypothesis is true and why?

What precautions should you take when comparing differences between means in a 1-way ANOVA and why?

If you select an appropriate covariate for your analysis, why will it increase the power of your analysis? Why might an inappropriate choice decrease the power of your analysis?

What is the typical null hypothesis associated with a contingency table?

What shape line does a logistic regression equation give and why is it a useful shape?

What sorts of clusters are difficult to detect accurately using k-means clusters?

What is the usual method of post-hoc analysis for a significant effect in MANOVA?

In discriminant function analysis (DFA), how is group membership of each case or response set determined?

Why does it make intuitive sense to use a cut of eigenvalues > 1 when determining which components to use in principle component analysis (PCA)?

What are the basic steps in evaluating the significance of a mediating variable?