UNSW SYDNEY

FACULTY OF SCIENCE
SCHOOL OF MATHEMATICS AND STATISTICS

MATH5935

STATISTICAL CONSULTANCY

Semester 2, 2017

Cricos Provider Code: 00098G

MATH5935 – Statistical consultancy
Course Outline

Information about the course

Course Authority/lecturer: Prof. David Warton
RC-2052, email david.warton@unsw.edu.au.

Consultation: Please use email to arrange an appointment.

Credit, Prerequisites, Exclusions:

This course counts for 6 Units of Credit (6UOC).

The course is intended for postgraduate or Honours students in statistics, but has no formal prerequisites.

Lectures:

Thursday 5-8pm RC-G012A

There will be **no Week 3 Lecture** (no August 10th lecture), please use this time to work on your first assignment (Literature study).

Moodle: Further information, including readings, assessments and discussion groups, will be provided via Moodle.

Course aims

This is a practical course which introduces students to the general framework of statistical consulting and gives students experience in solving statistical problems arising in practice.

Relation to other mathematics and statistics courses

Most postgraduate statistics courses focus on the theory and application of statistical techniques, often motivated by applied problems. This course is in contrast is very applied in its focus, and explores issues surrounding the application of statistical techniques – the process of identifying the core research question a client wishes to answer, diagnosing study design and analysis plans for common issues, effectively reporting statistical aspects of project outcomes in different contexts. *i.e.* The focus will be on communication of statistics as well as on the application of statistical methodology.

This course will provide valuable experience to any student wishing to become a statistician, especially as a consultant or as a member of an interdisciplinary team.

Student Learning Outcomes

By the end of this course you should be able to:

1. Explain the role of a consultant, how it varies across different contexts and projects, common difficulties and how to handle them professionally.
2. Explain the importance of communication in statistical consulting, and demonstrate strategies for effective communication.
3. Ask good questions, to better understand a client's problem and diagnose for common issues.
4. Recognise common designs and analyses and when they are appropriate, and identify common errors in their application.
5. Communicate statistical results effectively and appropriately in different contexts.

Relation to graduate attributes

The above outcomes are related to the development of most Science Faculty Graduate Attributes, in particular:

1. **Research, inquiry and analytical thinking abilities**
3. **Ethical, social and professional understanding**
4. **Communication**
5. **Teamwork, collaborative and management skills**
6. **Information literacy**

Teaching strategies underpinning the course

New ideas and skills are introduced and demonstrated in lectures and readings, then students develop these skills by applying them to specific tasks in assessments. Guest lecturers and consulting assessments will offer experience with the application of statistics in a workplace setting.

Rationale for learning and teaching strategies

We believe that effective learning is best supported by a climate of inquiry, in which students are actively engaged in the learning process. Hence this course is structured with an emphasis on case studies and problem-solving tasks in applied settings, including participating in actual client consultations and report preparation. Students are expected to devote a significant amount of class and study time to discussing and solving such tasks.

Assessment

Assessment in this course will consist of the following four tasks:

Task	Available	Due	How	Worth
Literature study	Week 1	Week 4 (August 17th)	Written report	15%
Consulting session	Week 1	Week 12	Consultation performance and summary report	40%
Report critique	Week 6	Week 10 (October 4th)	Written report	15%
Case study report	TBA	TBA	Written report	30%

There will be no final examination, the case study report will form a substitute for the final exam.

All assessments must be your own work, please consult the University web page on plagiarism

www.lc.unsw.edu.au/plagiarism

In all cases, late submissions will have 10% of the mark deducted for each day they are late, with no submissions accepted more than a week after they are due.

Further details given below.

Literature study (15%)

In this assessment you will be asked to read two papers concerning statistical consulting practice, at least one of which will be from a prescribed list, and summarise the main points you learn from the article concerning roles and responsibilities of the consultant, and core lessons you learn from the article. A list of suggested readings, at least one of which you should use in completing this task, will be available on

Moodle by your first class in Week 1. Your written submission, to be submitted through Moodle, should be submitted by **the start** of your week 4 class.

This task is the primary form of assessment of Learning Outcome 1 "Explain the role of a consultant, how it varies across different contexts and projects, common difficulties and how to handle them professionally".

Your report will be assessed based on demonstrated ability to relate content of the chosen articles to the context of learning outcome 1, to concisely summarise core points of the articles, and reflect on them from your own perspective.

Consulting session (40%)

The primary form of assessment in the course will be performance in a consulting session, where you will work with a Stats Central consultant on a project where you offer design and analysis advice to a UNSW researcher. You may attend and assist in more than one consultation, and can choose which of those to be assessed on. You should request to attend a consultation using the spreadsheet available on Moodle, and can attend any number of consultations during semester. A maximum of two students will be able to attend a consultation, and priority will be given to students who have not previously attended one. Depending on class size and consulting demand, you may not be able to attend more than a few consultations.

For consultations you choose to be assessed on, you are required to:

- Contribute productively to the consultation. This does not require any further action on your part beyond your contributions at the consultation itself.
- Write a report on the consultation which includes a description of the core problem to be addressed, and suggested ways to address the problem. This should be submitted via Moodle by the end of Week 12.

Note this task has two components to it, which assess learning outcomes 1-4 as below.

Firstly, your contributions at the consultation will be assessed by the Stats Central consultant and client, in terms of:

- Effectiveness of communication strategies, verbal and non-verbal (Learning Outcome 2, "Explain the importance of communication in statistical consulting, and demonstrate strategies for effective communication").
- Effectiveness identifying the client's core problem (Learning Outcome 3, "Ask

good questions, to better understand a client's problem and diagnose for common issues").

- Effectiveness in solving this problem (Learning Outcome 4, "Recognise common designs and analyses and when they are appropriate, and identify common errors in their application").

Secondly, your report submitted on Moodle will be assessed by your lecturer in consultation with the Stats Central consultant, in terms of:

- Clarity of explanation of the roles of the different attendees at the consultation (Learning Outcome 1, "Explain the role of a consultant, and how it varies across different contexts and projects")
- Effectiveness of (written) communication of the core problem and ways forward to solve it (Learning Outcomes 3-4).

The nature of the problem and ways forward can take many forms, but it should *not involve undertaking any data analysis*. It is will typically be a description of a design/analysis plan, or a description of the next steps in formulating a plan.

Report critique (15%)

In this assessment you will be asked to read a paper and/or a consulting report, then: describe in your own words as best you can the core problem being addressed; describe the design/analysis components used to address the core problem; and critique the statistical methods and their communication in the original document. Where appropriate, examples should be provided of how the statistics could have been better done or better communicated. Details will be available on Moodle by Thursday week 6 and your report should be submitted on Moodle by **the start** of your Thursday class of week 10.

Your submission will be assessed based on:

- Communication of the core problem being addressed and how the design/analysis addresses it, in particular clarity, conciseness, completeness (Learning Outcome 5, "Communicate statistical results effectively and appropriately in different contexts").
- Validity of critiques and suggestions on how to improve the statistics and/or their communication (Learning Outcome 4, "Recognise common designs and analyses and when they are appropriate, and identify common errors in their application").

Case study report (30%)

In this assessment you will be given a case study and asked to answer the core question posed and write a report of your findings as would be appropriate to be sent to a client. This will typically involve a data analysis component, with the data being available on Moodle. Details of your case study task will be available on Moodle. This task will be set towards the end of semester, precise availability and due date will be decided and announced in class and on Moodle by week 6.

This is the primary assessment of Learning Outcomes 4 "Recognise common designs and analyses and when they are appropriate, and identify common errors in their application" and 5 "Communicate statistical results effectively and appropriately in different contexts."

Your submission will be assessed based on:

- Demonstrated understanding of the client's problem (Learning Outcome 3).
- Effectiveness solving the problem (Learning Outcome 4).
- Effectiveness of written communication, which should be accessible to a non-statistician (Learning Outcome 5).

Additional resources and support

Moodle

All course materials will be available on Moodle. You should check regularly for new materials.

Summary notes

A set of summary notes, with revision exercises, will be available each week on Moodle.

Textbooks

This course will be based largely on the following texts:

J. Derr (2000) *Statistical consulting – a guide to effective communication*, Duxbury.

J. Cabrera & A. McDougall (2002) *Statistical Consulting*, Springer.

Both will be available in special reserve in the library, Cabrera & McDougall will be available as an e-book.

Computer laboratories

Computer laboratories (RC-M020 and RC-G012) are open 8am-9pm Monday-Friday, except on public holidays.

Course Evaluation and Development

The School of Mathematics and Statistics evaluates each course each time it is run. We carefully consider the student responses and their implications for course development. It is common practice to discuss informally with students how the course and their mastery of it are progressing.

Course schedule

The structure of this course closely follows Derr (2000), supplemented by topics from Cabrera & McDougall (2002). The following topics will be covered in the given order. Any variation from this will be indicated by the lecturer.

1. Introduction to statistical consultancy
2. The ideal consultant and the satisfied client
3. Non-verbal communication
4. Meetings
5. Common methodological issues
6. Asking good questions
7. Negotiating
8. Communicating about statistics
9. Dealing with difficult situations
10. Case studies

Administrative matters

Additional Assessment

See attached handout.

School Rules and Regulations

Fuller details of the general rules regarding attendance, release of marks, special consideration etc are available via the School of Mathematics and Statistics Web page at http://www.maths.unsw.edu.au/currentstudents/assessment-policies.

Plagiarism and academic honesty

Plagiarism is the presentation of the thoughts or work of another as one's own. Issues you must be aware of regarding plagiarism and the university's policies on academic honesty and plagiarism can be found at https://student.unsw.edu.au/plagiarism.

Occupational Health and safety

Please refer to the UNSW Occupational Health and Safety policies and expectations: http://www.gs.unsw.edu.au/policy/documents/ohspolicy.pdf.

Equity and diversity

Any equity and diversity issues should be directed to the Student Equity Officers (Disability) in the Student Equity and Diversity Unit (9385-4734). Further information for students with disabilities is available at http://www.studentequity.unsw.edu.au/.