STAT2201: Analysis of Engineering and Scientific Data (1 Unit)

COURSE PROFILE

DRAFT - AWAITING SCHOOL APPROVAL

The home area for STAT2201 is at:
http://www.maths.uq.edu.au/courses/STAT2201

- Any changes to course information will be announced in lectures or sent by bulk email to the whole class at students' University designated email addresses. The information will be reproduced on the STAT2201 home area as far as is possible. It is your responsibility to keep up to date with all information presented in your lecture group.

Contact and Advice

- The course coordinator is Professor John Eccleston, room 7.43 in the Priestley Building, (Bldg 67).

If you have any comments or suggestions on the course or have questions on the course material (apart from detailed questions), contact Professor Eccleston by email at jae@maths.uq.edu.au or by phone on 3365 3270. You are welcome to ask any questions about the course during consultation hours: ??????????????????. Different times will be available during swotvac.

Unfortunately, tutors are not paid to answer queries outside of class hours, so you should contact the lecturer directly.

If you have questions about your current or future program of study in Maths, contact the chief academic advisor, honours advisor or postgraduate advisor.

Brief Course Description

- STAT2201 introduces statistical analyses of engineering data, with emphasis on the nature of data and engineering case studies, and covering sampling, exploratory data analyses, experimental designs, probability modeling with the normal distribution, point and interval estimation, hypotheses tests, analysis of variance and regression, all in the context of a statistical package.

Assumed Background

- The course requires an understanding of calculus and algebra as given in MATH1050. A little understanding of matrices and multiple integration is helpful but not essential. It is a student's own responsibility to fill in any gaps in their assumed knowledge. You may need to undertake background reading to understand the lecture material.
Teaching Mode (1.5L 0.5T 0.5P)

- There are twenty lectures during the semester, at two per week for weeks 1-9 and 13. There are four tutorials and four computer laboratory sessions during the semester. Tutorials run in weeks 3, 5, 8 and 10, while laboratory sessions run in weeks 4, 6, 9 and 11. (see Tutorials and Laboratory sessions for more information about the schedule). As tutorial sheets and laboratory reports completed during these must be handed in at the end of each respective class, attendance at these is imperative.
- All classes begin on the hour. Please make every effort to be on time.
- Lectures: Room 27A, Thursday 10-12
- Tutorial/Laboratory: Tutorial and laboratory sessions will commence in week 3 and alternate from week to week, missing week 7. Thus, your tutorial and your laboratory session are at the SAME timeslot each week. There are six possible times (see table of class times) and allocation to these is done by sign-on via SI-net:

  YOU ONLY NEED TO SIGN ON FOR YOUR LABORATORY GROUP.

- It is essential that you go to the correct rooms each week to ensure the smooth running of the course.
- There are NO tutorials or laboratory sessions in weeks 1, 2, 7, 12 and 13.
- Public holidays: There are public holidays on Friday April 14, Tuesday April 25 and Monday May 1.
- Examination period: Study week is June 5-9, 2006. Examination period is June 10-24, 2006.

Learning Methods

- Lectures: The lectures will be devoted to covering and demonstrating the key concepts and ideas from the course. Every effort will be given to make lectures interactive: you are expected to participate actively in lectures and not just watch passively, while taking into account time constraints.
- Tutorials: There will be FOUR tutorials for each student. These will cover material from lectures, as well as some new material on occasions. As you learn data analysis by doing it, the tutorials have two objectives: to encourage you to work on your understanding of concepts and data analysis methods, and to provide you with an opportunity to show what you have learnt through a tutorial sheet which will be due at the end of each class.
- Laboratory Sessions: There will be FOUR laboratory sessions for each student. These will cover material from lectures and the use of a statistical package, MINITAB, as well as some new material on occasions. You will be taught how to use MINITAB. As you learn data analysis by doing it, the laboratory sessions have two objectives: to encourage you to work on your understanding of concepts and interpretation of the results of data analysis methods, and to provide you with an opportunity to show what you have learnt through a laboratory report sheet which will be due at the end of each class. The laboratory report will be submitted electronically.
Course Aims and Objectives

This course will endeavour

- to demonstrate the importance and holistic nature of the various stages of data analysis;
- to contrast determinism and randomness;
- to consider sources of variability and their impact on methods for data analysis;
- to demonstrate the importance of making and verifying assumptions which accompany data analysis;
- to develop processes of identifying key issues for data analysis in given real scenarios;
- to focus on approaches to making judgments on and drawing conclusions from statistical analyses; and
- to encourage development of analytical and communication skills to implement statistical methods in applied contexts.

The student will be able

- to present numerical information in a sensible and compact format;
- to translate a descriptive scenario into a rigorous statistical paradigm;
- to combine subjective impressions of numerical information with decisions on procedures for analysis and their outcomes;
- to discern appropriate methods for formal statistical analyses;
- to develop communication skills through a combination of report writing, individual problem solving and use of computers; and
- to link typical applications of data analysis to various contexts.

A student who achieves these aims and objectives will be on the path to being statistically literate!

Graduate Attributes

The following graduate attributes will be developed in the course.

- **In-depth Knowledge of the Field of Study**: enhancement of numerate skills; development of judgment in the art and science of statistics; awareness of the need for and use of statistics in engineering and related fields of research.
- **Effective Communication**: ability to collect, analyse and organise information and ideas, and to convey those ideas clearly and fluently, in both written and spoken forms; ability to interact effectively with others in order to work towards a common outcome; ability to select and use the appropriate level, style and means of communication; ability to engage effectively and appropriately with information and communication technologies.
- **Independence and Creativity**: ability to work and learn independently; ability to generate ideas and to adapt innovatively to changing environments; ability to identify problems, to create solutions, to innovate and to improve current practices.
• **Critical Judgment:** ability to define and analyse problems; ability to apply critical reasoning to issues through independent thought and informed judgment; ability to evaluate opinions, to make decisions and to reflect critically on the justifications for decisions.

• **Ethical and Social Understanding:** understanding of social and civic responsibility; appreciation of the philosophical and social contexts of statistics; knowledge and respect of ethics and ethical standards in relation to statistics; knowledge of other cultures and times and an appreciation of cultural diversity.

**Syllabus**

A detailed syllabus of STAT2201 can be obtained by going to the link [About this Course](#).

**Resources**

• **Text:** The lecture material is loosely based on **STATISTICS FOR ENGINEERING PROBLEM SOLVING** by Stephen B. Vardeman. This is a useful text and is available in the library (it is now out of print). There are a multitude of other introductory texts on engineering statistics which cover most of the topics in the course.

• **Course Notes:** Lecture notes will be able to be downloaded for each week from the homepage. These are currently being revised as the semester proceeds. The notes will be the overhead projector slides saved as pdf files and you should print them with two slides to a page. The notes will be annotated during the lectures, so it is important to attend lectures and annotate your own notes.

• **Software:** The statistical package, **MINITAB 14**, will be used in the laboratories. **MINITAB** is easy to learn, with a useful **HELP MENU**. A handout of basic information required to complete laboratory work will be available by the start of week 2. Read carefully the handout for the first session to ensure you know how to use the PC network.

• **Library contact:** The liaison librarian for the physical sciences disciplines is located in the Physical Sciences and Engineering Library in the Hawken Building and may be consulted for assistance in the course:
  
  Leith Woodall  
  Email: l.woodall@library.uq.edu.au  
  Extension: 52367

• **Web:** The course web page is at [http://www.maths.uq.edu.au/courses/STAT2201](http://www.maths.uq.edu.au/courses/STAT2201). Information about the course and other resources are available there.

**Assessment**

• **Assessment Scheme:** The assessment will consist of four tutorial sheets and four laboratory reports worth 32% of the final mark (each worth 4% each), one assignment worth 8% and an examination making up the remaining 60%.

• **Submission of tutorial sheets and laboratory reports:** Each tutorial sheet/laboratory report will be issued at the start of the appropriate
tutorial/laboratory session and will be due at the end of the class. All are of equal value (4% each) and will consist of several questions. These will be marked. The tutorial sheets will be returned at the following tutorial. Feedback on the laboratory reports will be available on the web about a week after being completed. There is no provision for late work (see next item for exemptions). See Tutorials and Laboratory Sessions for more information about the tutorial and laboratory sessions.

- **Assignment:** The assignment will take the form of a review of an Engineering specification or an article in an Engineering journal. Each student must choose their own article/specification and register their choice by the end of week 4. If, by the time you register your choice, another student has already registered the same article/specification, then you will need to choose another. The final review must be submitted electronically by the end of week 12. For more information regarding the assignment see Assignment.

- **If you miss an assessment item:** In case of illness (or bereavement) you may be exempted from a tutorial sheet or laboratory report if a medical certificate (or other documentation) is received by the course co-ordinator within one week of the date of the tutorial or laboratory session. If you are exempted, then an average for the other tutorial sheets and laboratory reports is taken and a total mark out of 32% will be returned. Please note that ad hoc excuses (car trouble and the like!) will not be accepted: only documentation in connection with illness or bereavement. If you enrolled late, then exemption will automatically be granted for anything missed before the date of enrolment.

- **Missed assessment items:** Failure to complete any item of assessment will result in a mark of zero for that component.

- **Plagiarism:** Plagiarism is the act of using another author's ideas and words or solutions without acknowledgement. It is a form of cheating and is considered as misconduct under official university policy and may attract severe penalties. You must not engage in plagiarism in any of your assessment items. For more information, consult the library UseIt on Plagiarism: http://www.library.uq.edu.au/ssah/useits/plaguseit.html.

- **Midsemester Examination:** There will be NO mid-semester exam.

- **Final Examination:** The final exam is closed book and ONE hour long, with 10 minutes perusal time. As the exam is a write-on exam (there will be plenty of space), you will not be able to make notes during perusal time. Calculators without ASCII capabilities are permitted. A formulae sheet and statistical tables will be provided. Familiarity with all sections of the lecture material (whether covered by tutorial sheets/laboratory reports or not), including material covered in the final weeks of the semester, will be assumed. The criteria for your assessment in the final examination will be your ability
  - to define, explain and synthesise the key concepts involved in the course;
  - to recognise the regime of applicability of the theory presented;
  - to use the basic theory to perform quantitative statistical computations;
  - to apply the theory to new statistical problems and to obtain correct results;
  - to utilise the appropriate statistical techniques for a given scenario; and
  - to read, understand and synthesise computer output of data analyses and to derive qualitative and quantitative results.
• **Assessment Criteria:**
  - To earn a Grade of 7, you must achieve a final mark between 85-100% by demonstrating an excellent understanding of the course material. This includes clear expression of nearly all deductions and explanations, the use of appropriate statistical techniques, and accurate answers to nearly all questions and tasks with appropriate justification. You will be able to apply statistical techniques to completely solve problems and make correct inferences.
  - To earn a Grade of 6, you must achieve a final mark between 75-84% by demonstrating a comprehensive understanding of the course material. This includes clear expression of most deductions and explanations, the general use of appropriate statistical techniques, and accurate answers to most questions and tasks with appropriate justification. You will be able to apply statistical techniques to partially solve problems and make correct inferences.
  - To earn a Grade of 5, you must achieve a final mark between 65-74% by demonstrating an adequate understanding of the course material. This includes clear expression of some deductions and explanations, the use of appropriate statistical techniques in some situations, and accurate answers to some questions and tasks with appropriate justification. You will be able to apply statistical techniques to solve fundamental problems and make correct inferences.
  - To earn a Grade of 4, you must achieve a final mark between 50-64% by demonstrating an understanding of the basic concepts of the course. This includes occasionally expressing deductions and explanations clearly, the occasional use of appropriate statistical techniques, and accurate answers to a few questions and tasks with appropriate justification. You will have demonstrated knowledge of statistical techniques used to solve problems and make correct inferences, and have applied this knowledge in some cases.
  - To earn a Grade of 3, you must achieve a final mark between 45-49% (47-49% for non-engineering students) by demonstrating some knowledge of the basic concepts of the course. This includes occasional expression of deductions and explanations, the use of a few appropriate statistical techniques, and attempts to answer a few questions accurately and with appropriate justification. You will have demonstrated knowledge of statistical techniques used to solve problems and make inferences. **Note: Under new university rules, a grade of 3 is not a passing grade!!**
  - To earn a Grade of 2, you must achieve a final mark between 20-44% (20-46% for non-engineering students) by demonstrating some knowledge of the basic concepts of the course. This includes attempts at expressing your deductions and explanations, and attempts to answer a few questions accurately and make correct inferences.
  - To earn a Grade of 1, you must achieve a final mark between 0-19%. This includes attempts at answering some questions but showing an extremely poor understanding of the key concepts.

**Personal Situation**

- **Disabilities:** Any student with a disability who may require alternative academic arrangements in the course is encouraged to seek advice at the commencement of the semester from a Disability Adviser at Student Support Services.
- **Personal Crises:** If you feel that problems in your life are interfering with your university performance, you should consult Student Support Services (or phone 51704) in the Student Union complex. They offer academic and personal support in a confidential environment for free to students. They can provide a letter to give to lecturers which will help your case for a special exam (there is no longer special consideration for examinations), but do not leave it too late.

If you are concerned about privacy with regard to medical certificates, please contact the University Health Service. With your permission, the Director will
contact your treating practitioner to clarify the extent of your medical condition or other incapacity, and provide lecturers with a report - the Director is bound by confidentiality obligations. In any case, we prefer this course of action, as we are not qualified to assess medical evidence. The procedure outlined here accords with the University's policy on student privacy and confidentiality. Assistance for Students:

- **English Language Difficulties**: Students with English language difficulties should contact the course coordinator. Students with English language difficulties who require development of their English skills should contact the Institute for Continuing and TESOL Education on extension 56565.
- **The Learning Assistance Unit located in the Relaxation Block in Student Support Services.** You may consult learning advisers in the unit to provide assistance with study skills, writing assignments and the like. Individual sessions are available. Student Support Services also offers workshops to assist students.
- **Student Liaison Officer**: The School of Physical Sciences has a Student Liaison Officer as an independent source of advice to assist students with resolving academic difficulties. The Student Liaison officer in 2006 is be Professor Peter Adams, Room 547 Priestley building, (email pa@maths.uq.edu.au ).

**Supplementary examinations**

A supplementary examination may be awarded in one course to students who obtain a grade of 2 or 3 in the final semester of their program and require this course to finish their degree. You should check the rules for your degree program for information on the possible award of supplementary examinations. Applications for supplementary examinations must be made to the Director of Studies in the Faculty. EPSA Faculty policy on the award of supplementary exams may be found via the Faculty Guidelines on Examinations from the EPSA student page [Supplementary Exams (EPSA)](#).

**Special examinations**

If a student is unable to sit a scheduled examination for medical or other adverse reasons, she/he can and should apply for a special examination. Applications made on medical grounds should be accompanied by a medical certificate; those on other grounds must be supported by a personal declaration stating the facts on which the application relies. Applications for special examinations for central and end-of-semester exams must be made through the Student Centre. Applications for special examinations in school exams are made to the course coordinator. More information on the University's assessment policy may be found at [Special Exams](#). EPSA Faculty policy on the award of special exams may be found via the Faculty Guidelines on Examinations from the EPSA student page [Special Exams (EPSA)](#).

**Feedback on assessment**: You may request feedback on assessment in this course progressively throughout the semester from the course coordinator. Feedback on assessment may include discussion, written comments on work, model answers, lists of common mistakes and the like. Students may peruse examinations scripts and obtain feedback on
performance in a final examination provided that the request is made within six months of the release of final course results. After a period of six months following the release of results, examination scripts may be destroyed. Information on the University's policy on access to feedback on assessment may be found at Feedback. EPSA Faculty policy on assessment feedback and re-marking may be found at Feedback (EPSA).