

MATH 177

Probability and Decision Modelling
COURSE OUTLINE

2014 [2/3]

This Course Outline is a *very important document*. Make sure that you read and understand what it has to say. Any changes or additional information will be announced in lectures and displayed on the course home page, http://msor.victoria.ac.nz/Courses/MATH177_2014T2/

LECTURERS

Dr John Haywood Room: CO 534 ph: 463 5673 John.Haywood@vuw.ac.nz

Dr Haywood is the Course Coordinator

Dr Mark Johnston Room: CO 531 ph: 463 5669 Mark.Johnston@vuw.ac.nz

COURSE AND LEARNING OBJECTIVES

MATH 177 provides an introduction to probability models in decision making, operations research and statistics including key concepts of probability, random variables and their distributions, decision theory and queueing systems. Students who pass MATH 177 should:

- understand elementary probabilistic or statistical models and the role of operations research in decision problems,
- be able to formulate, solve and interpret simple models in a variety of applications,
- appreciate the power, utility and generality of model-based approaches to real situations,
- be able to use goodness of fit tests to critically assess the validity of fitted models.

COURSE CONTENT AND (EXPANDED) PRESCRIPTION

Dr Haywood will lecture for the first six weeks (14 July–22 August, chapters 1–3 of the Course Notes), followed by Dr Johnston for the remaining six weeks of the trimester (8 September–17 October, chapters 4–7 of the Course Notes). Initially we look at probability theory, conditional probabilities, discrete and continuous probability distributions, and probability models for several random variables. Then we consider how to fit a model to data and how to check if the fit is good enough. Finally we look at the value of information in decision making, and modelling of queueing systems involving checkouts and lines of waiting customers.

WEEK ONE DEADLINE

By **3pm on Friday 18 July**, you are required to have signed up for a MATH 177 tutorial on s-cubed. See <https://signups.victoria.ac.nz/>

Failure to meet this requirement indicates to us that you have disengaged from the course. This will result in your name being sent to your faculty, who will start the process of disenrolling you from MATH 177.

COURSE MATERIALS

Course Notes (from Student Notes, sold through vicbooks)

All students should obtain a copy of *MATH 177: Probability and Decision Modelling 2014* (cost: \$12.50). It is sold by vicbooks (search their website at <http://www.vicbooks.co.nz/>). The lectures will follow these notes closely, although some (small) sections will not be covered in 2014 – further details will be announced in lectures.

Textbooks

A recommended reference text for major parts of the course (with Call Number *TA330 M662 I 4ed* in Victoria's Central Library, <http://www.victoria.ac.nz/library/>) is:

Milton, J.S. and Arnold, J.C. *Introduction to Probability and Statistics: Principles and Applications for Engineering and the Computing Sciences* (4th edition), McGraw-Hill, 2003.

A number of additional references are listed in the prescribed course notes, *MATH 177: Probability and Decision Modelling 2014*.

Calculators and Dictionaries

You will require a calculator that evaluates powers and logs, and has statistical options including at least the calculation of means and standard deviations (e.g. one of the current CASIO range.) Only silent non-programmable calculators or silent programmable calculators with their memories cleared will be permitted in the test and the final exam.

If English is not your first language, you can get permission to take an appropriate (paper) dictionary into the final examination. To do this, see the Course Coordinator well in advance.

ANNOUNCEMENTS AND WEB PAGE

MATH 177 notices, tutorials, assignments and useful information are on the course home page:

http://msor.victoria.ac.nz/Courses/MATH177_2014T2/

LECTURE TIMES

The trimester has 12 teaching weeks, 14 July – 17 October 2014, with a 2 week break from 23 August to 7 September. Lectures are timetabled as follows, in the Kirk and Cotton buildings:

| | | | |
|-----------|-------------|----------------|-----------------------------------|
| Tuesday | 3:10–4:00pm | Room: KK LT301 | every week |
| Wednesday | 3:10–4:00pm | Room: KK LT301 | every week |
| Friday | 3:10–4:00pm | Room: CO LT122 | in weeks 1, 3, 5, 7, 9, 11 |

Note that there will only be 30 lecture hours of the timetabled 36 hours used for presenting new lecture material. In particular, there will be no lecture on Fridays in weeks 2, 4, 6, 8, 10 and 12. However, the lecture on Friday of week 8 will be used for the MATH 177 test (more details below) and in some Friday lectures (TBA), we may use the time for additional (optional) Help Sessions, where tutors will be available to help work through any individual problems.

TUTORIALS

Tutorials start in the second week of the course, 21–25 July. Tutorials are extremely valuable in helping you to keep up with and master the lecture topics, and in preparing you for the assignment questions that are due the following week. At each tutorial, students will work through tutorial questions from the weekly tutorial sheet with the assistance of the tutor. The tutorials may also be used to discuss comments made by the markers and any points of difficulty in the course material. **You will need to download and print off the tutorial questions each week**, from the course home page. Printed model answers to the assignments will be provided, but

printed model answers to the tutorials will **not** be provided – you need to attend the tutorials to get benefit from that material.

Free Printing and Computer Account Activation

Computing facilities within the School of MSOR are available in lab on the 5th floor of Cotton building (CO 535): log on with your MSOR username. You will get free 2-up printing on those machines. Note that all MATH 177 students have an automatically-generated MSOR username, which should be activated (if necessary) as soon as possible, to prevent it being disabled due to account inactivity. To activate your account, follow the instructions in the computer labs. Some students choose not to use their MSOR accounts though, which is fine. (If you have problems logging on to the computers in the MSOR labs, ask for help at the School Office, CO 358.) Computers maintained by the Student Computing Service (SCS) are in the library (and elsewhere). They can also be used for viewing web pages, using your SCS account (printing there will not be free though).

Tutorial Times

Each week there will be five tutorials, starting from the second week. By 3pm on Friday 18 July you are required to sign up for a tutorial at <https://signups.victoria.ac.nz/>. You can go to as many tutorials as you like, if there is room. It is strongly advised that you go to at least one. The times and locations for tutorials are:

| | | | |
|-----------|---------------|--------|----------------------------|
| Monday | 11:00–11:50am | MY 403 | (Murphy building) |
| Tuesday | 9:00–9:50am | AM 106 | (Alan MacDiarmid building) |
| Tuesday | 10:00–10:50am | AM 106 | (Alan MacDiarmid building) |
| Wednesday | 9:00–9:50am | AM 104 | (Alan MacDiarmid building) |
| Thursday | 11:00–11:50am | KK 204 | (Kirk building) |

ASSIGNMENTS

Assignments are an essential part of the course and count 10% towards the course mark. There is also the possibility to gain an additional 5% of bonus marks, for good performance in assignment work throughout the course (see under Final Assessment for more details). Assignments provide solid practice in statistical and OR methods. Discussion of assignments with other students is encouraged and we recommend that students form ‘study groups’, in which material from the course can be discussed and worked on together. However, submitted work must be your own and copied work will be given zero marks. (See Academic Integrity and Plagiarism below, for other possible consequences of presenting someone else’s work as your own.)

Assignment questions will be posted on the Problem Sets web page, accessible from the course home page. **You will need to download and print your own copy** (see under Tutorials for more details on accessing computers and printing). Completed assignments are to be submitted in the appropriate locked cabinet (labelled for MATH 177), in the main corridor on Level 3 of Cotton Building, by 2pm of the due date (all Fridays). The first assignment is due by the second Friday of the trimester (25 July). Marked work will be available from the MSOR School office (CO 358) the week after you submitted it, but only at the times listed on the Marked Assignments page. Show your Student ID card to collect your work. See:

<http://msor.victoria.ac.nz/Main/MarkedAssignments>.

You should keep your marked Assignments and Test (see below) for revision purposes and evidence of completion, should that be required. Late assignments will not be accepted without a medical certificate or similar documentation, and must be discussed with the course coordinator, Dr Haywood.

FINAL ASSESSMENT

Each type of assessment relates to all the course objectives. **To pass the course, you need a course mark of 50% or more.** Your course mark will be calculated from:

Assignments: 10% Test: 15% Final Exam: 75%

Assignments

There will be 10 assignments. The total marks available for each assignment may vary, but the following principles will apply to all of them.

- For one assignment, suppose your mark is $M\%$ (with 100% obviously a 'perfect' score). If $M \geq 50$ then you gain **ONE point** towards your assessment. Or if $M < 50$ then you gain $M/50$ points towards your assessment (doubling your mark, basically). *This means you should attempt every assignment, since getting at least half marks on all of them would get you the full 10% towards your final grade.*
- Now consider your average assignment mark (not points) over all assignments. If your average assignment mark is $\geq 70\%$ then you receive a **BONUS of 5 points**. But if your average assignment mark is $< 70\%$ you will **not** receive a bonus. *This means you should do your best in each assignment.*
- The assessment contribution from assignments is therefore the points for each assignment (maximum of 10) plus the bonus (5 points or nothing). It is therefore possible to gain 105% for this course, if you average at least a B ($\geq 70\%$) on your assignments.

Test

There is one in-term, 50-minute Test. It will be held in the lecture time on **Friday 19 September (in room CO LT122)**. Please enter this date in your diary now (and be on time for that lecture!).

Final Exam

The Final Exam will be three hours in length and will cover material from the whole course. It will be held in the examination period that runs from 24 October–15 November 2014; you should be available during that time. We reserve the right to scale final course marks.

Mandatory Course Requirements (Terms)

The mandatory course requirements (terms requirements) are:

- sign up for a tutorial, no later than 3pm on Friday 18 July;
- sit the test.

Exemptions to these terms requirements will be granted only by the Course Coordinator, for approved reasons, e.g. illness or bereavement, and proper documentation (e.g. a medical certificate) must be provided. Missing assignments without approval results in a mark of zero. Aegrotat considerations are based on assignment and test marks.

WORKLOAD

Although the workload will vary from week to week, you should expect to spend approximately 10-12 hours per week on the course, including time for revision before the exam.

WITHDRAWALS

Students should be aware of the regulations regarding withdrawals from University courses:
<http://www.victoria.ac.nz/home/admisenrol/payments/withdrawalsrefunds.aspx>

VUWSA CLASS REPRESENTATIVE

A class representative will be elected in the first week and their contact details will be posted on the course homepage. Your class representative is available if you come across problems and for any reason the issue cannot be resolved directly with staff. If you would like to talk about a concern you have, please contact your class rep and a meeting can be arranged.

STUDENT FEEDBACK

Student feedback on the course from previous years may be found at:
http://www.cad.vuw.ac.nz/feedback/feedback_display.php

STUDENT LEARNING SUPPORT SERVICE

Extra help is available for students from the Student Learning Support Service. They are at Level 0, Kirk Wing, Hunter Courtyard, Kelburn Parade, student-learning@vuw.ac.nz, phone 463 5999, website http://www.victoria.ac.nz/st_services/slss

A NOTE ON WHICH FIRST YEAR STATISTICS COURSES YOU SHOULD TAKE

- If you have studied calculus, either at school to NCEA level 3 or in MATH 132 (or ENGR 121 or MATH 141), then you should be able to handle the mathematical content of MATH 177. MATH 177 is designed to serve as an introduction to Mathematical Statistics and Operations Research, as developed in the Mathematical Statistics course MATH 277 and the Operations Research course OPRE 253. Entry from MATH 177 to the more applied course STAT 292 (and subsequently STAT 293) is possible, but may require a little extra reading. Note that MATH 142 and 151 are prerequisites for MATH 277. MATH 177 meets the Statistics requirement for the BE(Hons) in Software Engineering and the BSc in Computer Science, but so too does STAT 193 (see below).
- If you have not studied much calculus, you are advised to transfer to STAT 193, Statistics for Natural and Social Sciences, which has school Mathematics to at least Year 12 level as the preferred entry requirement. STAT 193 gives a first introduction to statistics aimed primarily for students intending to focus on statistical applications, the biological or social sciences, or who hope to work in social policy research. Topics covered include estimation and comparison of means and proportions, simple regression and correlation, analysis of variance, and some nonparametric techniques. The course includes some linked practical assignments, in which students have their own data sets and apply an increasing range of techniques to discover the principal features.

The courses MATH 177 and STAT 193 together form a sound introduction to the methods of Mathematical and Applied Statistics, and Operations Research.

INFORMATION ABOUT THE SCHOOL

The School of Mathematics, Statistics and Operations Research (MSOR) is located in the Cotton Building on the Kelburn Campus.

- The School Office is in CO 358, on the 3rd floor of the Cotton Building. The office is open from 8.30am-5.00pm
- The School website is <http://msor.victoria.ac.nz>
- Hand in boxes for assignments are on level 3 of the Cotton Building
- Assignments can only be collected from the office at certain times, listed on the Marked assignments page: <http://msor.victoria.ac.nz/Main/MarkedAssignments>
- There is a noticeboard opposite the School Office where students seeking and offering private tuition in mathematics and statistics can put requests and advertisements.

OTHER IMPORTANT INFORMATION

The information above is specific to this course. There is other important information that students must familiarise themselves with, including:

- **Academic Integrity and Plagiarism:**
www.victoria.ac.nz/students/study/exams/integrity-plagiarism
- **Aegrotats:** www.victoria.ac.nz/students/study/exams/aegrotats
- **Academic Progress:**
www.victoria.ac.nz/students/study/progress/academic-progress (including restrictions and non-engagement)
- **Dates and deadlines:** www.victoria.ac.nz/students/study/dates
- **Grades:** www.victoria.ac.nz/students/study/progress/grades
- **Resolving academic issues:**
www.victoria.ac.nz/about/governance/dvc-academic/publications
- **Special passes:** www.victoria.ac.nz/about/governance/dvc-academic/publications
- **Statutes and policies including the Student Conduct Statute:**
www.victoria.ac.nz/about/governance/strategy
- **Student support:** www.victoria.ac.nz/students/support
- **Students with disabilities:** www.victoria.ac.nz/st_services/disability
- **Student Charter:**
www.victoria.ac.nz/learning-teaching/learning-partnerships/student-charter
- **Student Contract:**
www.victoria.ac.nz/study/apply-enrol/terms-conditions/student-contract
- **Turnitin:** www.cad.vuw.ac.nz/wiki/index.php/Turnitin
- **University structure:** www.victoria.ac.nz/about
- **VUWSA:** www.vuwsa.org.nz