



BUSINESS SCHOOL
Te Kura Pakihi

DEPARTMENT OF INFORMATION SCIENCE

Advanced Data Science
INFO304

COURSE OUTLINE

Semester Two 2022

Contents

| | |
|---|---|
| Paper Description and Aims | 1 |
| Learning Outcomes | 1 |
| Teaching Staff | 1 |
| Course Delivery..... | 1 |
| Expectations and Workload | 2 |
| Course Learning Resources | 2 |
| Blackboard..... | 2 |
| Student Webmail | 2 |
| Assessment..... | 3 |
| Assignments – 100% | 3 |
| Late Assignments | 3 |
| Quality Assurance | 3 |
| Learning Outcomes..... | 3 |
| Grading System | 4 |
| Academic Integrity and Academic Misconduct (Plagiarism) | 4 |
| Course Calendar..... | 5 |
| Student Learning Support and Information | 6 |
| Student Charter | 6 |
| Guidelines for Learning at Otago | 6 |
| Student Learning Centre | 6 |
| Library Support..... | 6 |
| Kaiāwhina – Māori Student Support..... | 7 |
| Pacific Support..... | 7 |
| Student Feedback..... | 8 |
| Class Representatives | 8 |
| Concerns about the Course | 8 |
| Disclaimer | 8 |

Paper Description and Aims

Modern computational methods have been developed that allow prediction, optimisation and interpretation for a range of different problem types with varying complexities. Guided by case studies, assignments and laboratory exercises, this paper will develop critical skills in the understanding and modelling of data using modern data science techniques. The fundamental link between knowledge of the processes that generated the data and the outcomes of models will be emphasised.

Learning Outcomes

Upon successful completion of this paper, students will develop the ability to:

- Visualise, interpret and critically assess the quality and fitness for use for a range of different data types and processes;
- Assess the suitability of data sources with respect to the requirements of modelling and decision making;
- Critically assess the limitations and assumptions related to different modelling methods;
- Apply a range of models to understand and critically assess the resulting outcomes of these methods in terms of decision making.

Teaching Staff

Paper Coordinator/Lecturer

Name: Peter A. Whigham
Office: Commerce Building Level 3, Room 3:43
Email: peter.whigham@otago.ac.nz
Office Hours: Please contact me via email to organise a meeting.

Lab Support

Name: Yuan Yue
Email: yueyu445@student.otago.ac.nz

Course Delivery

Lectures Day/Time: Monday 10 - 10:50 am, Tuesday 10:00 - 10:50 am
Tutorial: Wednesday 3:00 – 3:50pm
Labs Day/Time: Monday 2:00pm – 4:00 pm
Tuesday 2:00pm – 4:00 pm

Lectures present the key conceptual material through discussion and interaction between teaching staff and students. Lectures are often supported by additional readings. Lectures may be recorded and provided via a link on Blackboard.

Tutorials are interactive, collaborative sessions in which students attempt to cement concepts presented at lectures with their peers in a supportive environment. Tutorials will be used to discuss the issues and concepts of lectures, and support the assignment and laboratory work.

Labs are interactive, collaborative sessions in which students will develop skills in the R programming language to implement concepts presented in the lectures. They will also offer support for completion of assignments using RStudio.

Course Calendar The course calendar (in this outline) details scheduling information. Note that this calendar may change as the course proceeds. Any changes will be announced at lectures and be detailed on Blackboard.

Students are expected to prepare for and attend all classes to gain full benefit from the course

These activities should be prepared for by reviewing information detailed on Blackboard and completing any assigned readings. Students unable to attend a lecture or lab session are expected to catch up on missed material.

Expectations and Workload

Students are expected to spend approximately 200 hours during the semester on INFO304. This means that outside of contact hours (approx. 5 hours per week) the student should expect to have to spend up to 10 hours per week with additional lab work, assignment work and readings.

Course Learning Resources

There is no set textbook; however a number of texts will be made available online via Blackboard. Readings and other required work will be indicated during the lectures. In particular, the book "*An Introduction to Statistical Learning*", by G. James, D. Witten, T. Hastie & R. Tibshirani provides an excellent and detailed background to many of the concepts in this paper. This is available online through the library website and provided on Blackboard.

Blackboard

Blackboard <https://blackboard.otago.ac.nz/> provides you with access to course materials, class notices, and resources. Blackboard is used to email the whole class so it is important that you check your student email and *Blackboard* regularly.

Student Webmail

IMPORTANT - DO THIS NOW:

Forward your University email address to an email address that you use regularly as follows:

1. [Log into your StudentMail account](#) using your student username and password
2. Click **Cog button (top right corner) > Options**

3. Under **Account**, select the **Forward your email** shortcut under the **Short Cuts** menu on the right side of the screen.
4. Under the Forwarding heading, type in the email address you want your email to be forwarded to. You can also choose to have a copy of these emails kept on your StudentMail account, so please check the box if you would like this.
5. Click the **Start forwarding** button.

Assessment

All-important assessment information such as due dates and times, content, guidelines and so on will be discussed at lectures and, where appropriate, detailed on Blackboard. *Students are responsible for ensuring that they are aware of this information, keeping track of their own progress, and catching up on any missed classes.* Note that all assessment is based on assignments, which will be a mix of technical work and essay-like questions.

Assignments – 100%

| Description | % Final Course |
|---|----------------|
| Assn 1. Visualisation, Linear models, Decision Trees | 25% |
| Assn2. Logistic Regression, Random Forests, Variable importance | 25% |
| Assn3. Genetic Algorithms, Multi-objective modelling | 25% |
| Assn4. Hospital Data Case Study | 25% |

Late Assignments

Assignments are due at the time and in the place stated on the assignment handout. Extensions will not be allowed except in exceptional circumstances. **Late assignments will not be accepted.** Submission of assignment work will be through blackboard – this will be discussed in lectures.

Quality Assurance

At the Otago Business School, we monitor the quality of student learning and your learning experience. Your assessed work may be used for assurance of learning processes, such as evaluating the level of achievement of learning outcomes, with the aim of improving the quality of our programmes. All material used for quality assurance purposes will be treated as confidential and the outcome will not affect your grades.

Learning Outcomes

| Learning outcome | Teaching and learning method | Assessment |
|------------------------------------|------------------------------|------------|
| 1. Visualise, interpret,... | Lectures, tutorials, labs | A1-4 |
| 2. Assess the suitability ... | Lectures, tutorials, labs | A2-4 |
| 3. Critically assess limitations.. | Lectures, tutorials, labs | A2,4 |
| 4. Apply a range of methods ... | Lectures, tutorials, labs | A1-4 |

Grading System

The grading scheme used at Otago is:

| | | | |
|-----------|--------|-----------|-------|
| A+ | 90-100 | C+ | 60-64 |
| A | 85-89 | C | 55-59 |
| A- | 80-84 | C- | 50-54 |
| B+ | 75-79 | D | 40-49 |
| B | 70-74 | E | <40 |
| B- | 65-69 | | |

Academic Integrity and Academic Misconduct (Plagiarism)

Students should ensure that all submitted work is their own. Plagiarism is a form of academic misconduct (cheating). It is defined as copying or paraphrasing another's work and presenting it as one's own. Any student found responsible for academic misconduct in any piece of work submitted for assessment shall be subject to the University's dishonest practice regulations, which may result in serious penalties, including forfeiture of marks for the piece of work submitted, a zero grade for the paper, or in extreme cases, exclusion from the University. The University of Otago reserves the right to use plagiarism detection tools.

Assignments will be checked for plagiarism – please use references and quotations (if required) for all work that derives from external sources. Copying between students will be detected and given zero marks.

Students are advised to inform themselves about University policies concerning dishonest practice and take up opportunities to improve their academic and information literacy. If necessary, seek advice from academic staff, or the Student Learning Centre. The guideline for students is available at this link: <http://www.otago.ac.nz/study/academicintegrity/index.html>

Course Calendar

| Week Beginning | Lecture 1 (Monday) | Lecture 2 (Tuesday) | Labs (Monday/Tuesday) |
|----------------------------------|---|---|---|
| 11th July | Introduction to INFO304 and RStudio | Visualisation in R, Data Representation. | Introduction to RStudio |
| 18th July | K-NN, Linear Modelling, Decision Trees, Evaluating Models | Time Series Data 1 | Linear Models, Decision Trees, Time Series |
| 25th July | Time Series Data 2 | Bias/Variance tradeoff and Model Complexity | Assn 1 Support (Due 1st August) |
| 1st August | Logistic Regression | Missing Values | Logistic Regression, Missing Values |
| 8th August | Random Forests - Implementations | Sensitivity Analysis | Decision Trees, Sampling, Permutations |
| 15th August | What makes a good model? What is causality? | What makes a problem hard? | Assn 2 support (Due 22nd August) |
| 22nd August | Stochastic Search: the simple genetic algorithm | Modelling and prediction using a GA. Representation issues. | Modelling and Prediction; GA |
| 29th August | MID-SEMESTER BREAK | | |
| 5th September | Multi-objective and multi-criteria methods; NSGA2 | Multi-objective optimisation and Adaptive Business Intelligence | Multi-objective Optimisation |
| 12th September | Business Modelling | Local versus Global Models | Assn 3 support |
| 19th September | Networks – connectivity as a model | Network examples: The Medici Family, Facebook | Assn 3 support (Due 26th September) |
| 26th September | Hospital Data 1 | Hospital Data 2 | Introduction to the Hospital Coding System |
| 3rd October | Spatial Data 1 | Spatial Data 2 | Assn 4 support |
| 10th October | Case Study 1 | Case Study 2 | Assn 4 support (Due 14th October) |

Second Semester ends Friday 14th October

Note: There is no final exam.

Student Learning Support and Information

Student Charter

<http://www.otago.ac.nz/about/otago0005275.html>

Guidelines for Learning at Otago

<http://hedc.otago.ac.nz/hedc/wp-content/uploads/2012/12/Guidelines-for-Learning.pdf>
<http://hedc.otago.ac.nz/hedc/learning/>

Student Learning Centre

The Student Learning Centre, which is part of the Higher Education Development Centre, provides learning support, free of charge, to ALL enrolled students. Their services include:

- a workshop programme designed to help students to improve their learning strategies and their generic skills;
- individual assistance with learning issues;
- on-line study skills advice;
- a student leadership programme
- a student-led peer support programme for students of all ages and backgrounds.
- conversational English groups for students from a non-English speaking background

The Centre also provides two very helpful study guides, "Guidelines for Writing and Editing" and "Writing University Assignments" and these are available on the SLC website.

<http://slc.otago.ac.nz/>

Library Support

The Library website <http://www.otago.ac.nz/library> provides access to resources and services, including group room bookings, library hours and locations, past exam papers, subject guides, article databases and more.

If you need assistance either check out the self-help guides <http://otago.libguides.com/selfhelp>, or ask Library staff at the ground floor service desks, or email ask.library@otago.ac.nz

Kaiāwhina – Māori Student Support

Kia ora e te whānau!

My name is Shay Edwards, and I am introducing myself as your Kaiāwhina Māori (student support) for Te Kura Pākihi, Otago Business School. I am looking forward to meeting you throughout the year.

I am from the far North, in a beautiful coastal town called Whatuwhiwhi. I also grew up in Tāmaki Makarau in a suburb called Te Atatu. I am super passionate about immersing Te Ao Māori & Te Reo Māori in digital spaces and am involved in two Māori e-sports platforms, Ngāti Gaming and VictoryUp NZ.

My role is to support taura Māori succeed while they are at Te Kura Pakihi. I can help with:

- academic studies, including tutoring and mentoring, particularly through Te Huka
- Mātauraka (the Māori Centre)
- access to funding and scholarships
- pastoral care, personal support and leadership development
- options for jobs, internships and future pathways, including post-graduate study
- Taura Māori feeling heard and safe

I will be reaching out to students over the year but feel free to contact me if you have any questions, feedback or concerns. Please don't be whakamā (shy).

Te Maea, 6th floor Otago, Business School

Division of Commerce

Office: 6.13

Email: shay.edwards@otago.ac.nz

Telephone: 479 5432

Pacific Support

Malo e lelei

Falaviena Faiva works part-time in the Dean's Office at the Otago Business School, Division of Commerce. She is of Tongan descent and is one of the Pacific Student Support Facilitator's responsible for all **first-year** Pacific students in the division.

Falaviena is a University of Otago, Humanities and Commerce graduate and is currently completing a Postgraduate Commerce degree in International Business.

Deans Office, Otago Business School

Division of Commerce

Email: viena.faiva@otago.ac.nz

Cell Phone: 021 279 0914

Bula Vinaka.

Jekope Ramala Maiono also works part time in the Dean's Office at the Otago Business School, Division of Commerce. He is of Fijian descent and is the other Pacific Student Support Facilitator responsible for all **second-year** Pacific students in the division.

Maiono is a University of Otago Commerce graduate, also studying a PHD degree in the Division of Humanities.

Deans Office, Otago Business School

Division of Commerce

Email: jekope.maiono@otago.ac.nz

Cell Phone: 021 279 0871

Student Feedback

We encourage your feedback. This can be in the form of contacting staff, participating in course evaluation surveys and communicating with class representatives. Continual improvements will be made to this course based in part on student feedback. Recent changes to INFO304 include new lectures on text mining, a change in emphasis of concepts in early lectures, and a revised set of tutorial questions.

Class Representatives

The class (or student) representative system is an avenue for encouraging communication and consultation between staff and students. It provides you with a vehicle for communicating your views on the teaching and delivery of the paper and provides staff with an opportunity to communicate information and gain constructive feedback from students. It contributes to the development of a sense of community within a department and it adds a further dimension to the range of support services offered to students.

Volunteers for the role of class representatives will be called early in the semester. The OUSA invites all class representatives to a training session, conducted by OUSA, about what it means to be a class representative and some of the possible procedures for dealing with issues that arise. They also provide information on the services that OUSA offers and the role OUSA can play in solving problems that may occur. The OUSA provides support to class representatives during the semester. Departmental staff will also meet with class representatives during the semester to discuss general issues or matters they wish to have considered.

Your class representative's name and contact details will be posted on Blackboard early in the semester.

Concerns about the Course

We hope you will feel comfortable coming to talk to us if you have a concern about the course. Alternatively, you can report your concerns to the Class Representative who will follow up with me or the Head of Department. Hopefully you will feel comfortable to see me in the first instance. If, after making approaches via these channels, you do not feel that your concerns have been addressed, there are University channels that may aid resolution. For further advice or more information on these, contact the departmental administrator or head of department.

Disclaimer

While every effort is made to ensure that the information contained in this document is accurate, it is subject to change. Changes will be notified in class and via Blackboard. Students are encouraged to check Blackboard regularly. It is the student's responsibility to be informed.