



BUSINESS SCHOOL  
Te Kura Pakihi

DEPARTMENT OF INFORMATION SCIENCE

Advanced Business Intelligence  
INFO424

COURSE OUTLINE

Semester One 2022

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## Paper Description and Aims

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Business processes are a complex and dynamic system. Traditional methods of business intelligence do not fully capture the complexities of these data. Modern computational methods have been developed that aid in the prediction, optimisation and adaption of decision making in these processes. Guided by case studies, tutorial questions, assignments and laboratory exercises, this paper will introduce a number of methods for these forms of analyses, and therefore develop student skills for a range of approaches to comprehend business processes.

## Learning Outcomes

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

- Identify the activities of prediction, optimisation, and adaptation that exist within a business process;
- Assess the suitability of data sources with respect to the requirements of business processes and decision making;
- Critically assess methods used to design tools for prediction, optimisation and adaptation in business processes;
- Apply a range of suitable methods to perform prediction, optimisation and adaptation in business processes, based on case study data.

## Teaching Staff

### Paper Coordinator(s)/Lecturer(s)

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. I will only be available for the first 4 weeks of semester two.

## Course Delivery

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Lectures Day/Time: Online – to be arranged – Monday & Tuesday

Tutorial: Wednesday

Labs Day/Time: To be arranged – Online support for lab work and discussion

**Lectures** present the key conceptual material through discussion and interaction between teaching staff and students. Lectures are supported by readings. Lectures will 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. Tutorial assessments will be discussed, issues and concepts of lecturers revisited, and assignment work/concepts introduced.

**Labs** are interactive, collaborative sessions in which students attempt to cement concepts presented at lectures with their peers in a supportive environment. 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 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 are expected to catch up on missed material. Unless stated otherwise, all aspects of the course are examinable.

#### **Expectations and Workload**

Students are expected to spend approximately 200 hours during the semester on INFO424. 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 final exam preparation.

#### **Course Learning Resources**

There is no set textbook; however a number of texts will be made referenced 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

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All material presented is examinable (except where stated otherwise) by assignments and the final examination. 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.*

#### Short Written (Tutorial) Exercises – 10%

There will be 5 short written exercises, each worth 2%. These aim to ensure that the student has read and understood the lecture material and concepts from the labs. These exercises will be given out every two weeks and will be returned and discussed at the tutorials. **No late submissions will be accepted.**

#### Assignments – 40%

Description	% Final Course
Assn 1. Data analysis, clustering, visualisation	10%
Assn2. Modelling, prediction, assessing model concepts	15%
Assn3. Multi-objective modelling	15%

#### Examination – 50%

The end of semester examination comprises 50% of the course assessment. All course material (except where noted) is examinable. Details of the exam will be given in the last week of semester.

#### Course Requirements

A student **must obtain 40% or more in the final exam** and a **final grade of at least 50% (-C)** to pass INFO424.

#### 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 tutorial and 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. Identify the activities ...	Lectures, tutorials, labs	A1, A2, WA, FE
2. Assess the suitability ...	Lectures, tutorials, labs	A1, A2, WA, FE
3. Critically assess methods ...	Lectures, tutorials, labs	A2, WA, FE
4. Apply a range of methods ...	Lectures, tutorials, labs	A2, A3, WA, FE

Note: "A1" = assignment 1; "A2" = assignment 2; "A3" = assignment 3; "WA" = weekly assignments; "FE" = final examination. If more than one assessment is listed for a learning outcome, the assessments are listed in decreasing order of significance.

### Grading System

The grading scheme used at Otago is:

<b>A+</b>	90-100	<b>C+</b>	60-64
<b>A</b>	85-89	<b>C</b>	55-59
<b>A-</b>	80-84	<b>C-</b>	50-54
<b>B+</b>	75-79	<b>D</b>	40-49
<b>B</b>	70-74	<b>E</b>	<40
<b>B-</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.

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	Lecture 2	Labs
28 <sup>th</sup> Feb	Introduction to Adaptive Business Intelligence. Data quality: Granularity, scale and sampling.	Visualisation and transformation of business data.	Introduction to “R”
7 <sup>th</sup> March	Correlation; Feature reduction; Feature transformation	Unsupervised learning: clustering	Visualisation/Clustering methods
14 <sup>th</sup> March	Supervised Learning, k-nearest neighbour	Supervised Learning: decision trees	Clustering & Prediction methods Assn 1 support
21 <sup>st</sup> March	Supervised Learning: artificial neural networks	Case Studies on the role of supervised and unsupervised learning for business	<b>Assn 1 support (Due 28<sup>th</sup> March)</b>
28 <sup>th</sup> March	Regression Models: Linear and Multiple Linear regression;	Multiple-Linear Regression; Logistic Regression; Examples	Linear Modelling, Statistical Methods
4 <sup>th</sup> April	Time-series Analysis: Extracting the Seasonality and Trend	Time Series Example – Cleaning data and analysis	Time series – Assn 2 support
11 <sup>th</sup> April	Stochastic Search: the simple genetic algorithm	Modelling and prediction using a GA. Representation issues.	Modelling and Prediction; GA
18 <sup>th</sup> April	<b>MID-SEMESTER BREAK</b>		
25 <sup>th</sup> April	Networks – connectivity as a model	Network examples: The Medici Family, Facebook	<b>Assn 2 Support (Due 2<sup>nd</sup> May)</b>
2 <sup>nd</sup> May	Multi-objective and multi-criteria methods; Multi-objective business problems and case studies	Multi-objective optimisation, NSGAII and “R”	Model Evaluation
9 <sup>th</sup> May	Multi-objective optimisation and Adaptive Business Intelligence	Local versus Global Models	Multi-objective Optimisation
16 <sup>th</sup> May	Bagging, Boosting, Random Forests	Ensemble Methods Continued	Party with the MOB; Random Forests
23 <sup>rd</sup> May	Case studies in representation, Mining Unstructured Data	Unstructured Data: Text Mining and Word2Vec	<b>Assn 3 Support (Due 30<sup>th</sup> May)</b>
30 <sup>th</sup> May	Sensitivity Analysis	Summary and review Exam preparation	No Lab

**First Semester ends Friday 3<sup>rd</sup> June**  
**University Exam Period 1<sup>st</sup> Semester: Wednesday 8<sup>th</sup> June**  
**till Wednesday 22<sup>nd</sup> June**

## 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](mailto: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
- Taurira 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).

Office Hours |10am - 12pm: Mon, Wed, Fri  
Te Maaea, Room 6.13, 6th floor  
Te Kura Pākihi |Otago Business School

### **OBS Pacific Student Support (Part-time)**

#### **Faleviena Faiva**

Malo e lelei

Falaviena 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](mailto:viena.faiva@otago.ac.nz)  
Cell Phone: 021 279 0914

#### **Jekope Ramala Maiono**

Bula Vinaka.

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](mailto:jekope.maiono@otago.ac.nz)  
Cell Phone: 021 279 0871

### **Disability Information and Support**

Students are encouraged to seek support if they are having difficulty with their studies due to disability, temporary or permanent impairment, injury or chronic illness. It is important to seek help early, through one of the contacts below:

Website: <http://www.otago.ac.nz/disabilities>

65 Albany St, West Lane, ISB, Student Services

Tel: +64 3 479 8235 Email: [disabilities@otago.ac.nz](mailto:disabilities@otago.ac.nz)

## **Student Feedback**

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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 INFO424 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**

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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.