BUSINESS SCHOOL

Course Outline 2018
OPSMGT 752: RESEARCH METHODS - MODELLING (15 POINTS)
Semester 2 (1185)

Course prescription

Mathematical modelling methods in operations management research. Includes simulation techniques, Markov decision models, optimisation methods, game theoretic formulations, and other modelling methods.

Course advice

Admission to the Operations and Supply Chain Management postgraduate programmes requires STAT 255, INFOMGT 290, or STAT 208. These courses or equivalent are strongly recommended as a prerequisite.

Goals of the course

Mathematical modelling is a core competency in Operations and Supply Chain Management research. The course's specific quantitative modelling toolset is designed to be both accessible and fundamental. Most of the models will be spreadsheet based but some will be purely theoretical and others will use discrete event simulation. The focus of the course is on developing students' skills for:

- Understanding and making modelling assumptions;

- Choosing between different approaches, support tools, and analytical methods for modelling;

- Reading and understanding research papers in operations and supply chain management that use modelling techniques; and

- Using models for decision making and guiding business intuition.

Learning outcomes (LO)

#	Learning outcome	Graduate profile capability*
LO1	Be able to apply the major concepts and tools used in mathematical modelling in open ended settings	1. Disciplinary knowledge and practice 5a. Independence
LO2	Manage and assess the trade-off between modelling assumptions	1. Disciplinary knowledge and practice

#	Learning outcome	Graduate profile capability*
	and tractability in authentic case studies	
LO3	Demonstrate critical and creative thinking in being able to formulate, justify, and evaluate models for operational decision making	2. Critical thinking 3. Solution seeking
LO4	Exhibit improved information literacy skills in being able to source, evaluate, and summarise appropriate information on a given subject or topic in operations and supply chain management	5a. Independence 4b. Communication (Written)
LO5	Present and articulate opinions both in class exercises and for your own models on key modelling assumptions and other modelling concepts	5a. Independence 4a. Communication (Oral)
LO6	Be able to work in a team to complete an open-ended modelling project	4c. Engagement 3. Solution seeking

* See the graduate profile this course belongs to at the end of this course outline.

Content outline

Week / Module	Topic	Assessment due this period
Week 1:	Introduction to Modelling	
Week 2:	Modelling uncertainty	
Week 3:	Uncertainty and simulation	
Week 4:	Uncertainty and queues	Assignment 1
Week 5:	Discrete event simulation	Project proposal
Week 6:	Simulation continued	
Week 7:	Optimisation models	Assignment 2
Week 8:	Optimisation and uncertainty	
Week 9:	Unstructured problem solving	
Week 10:	Markov decision processes	Assignment 3
Week 11:	Games and decisions	
Week 12:	Wrap-up	Project

Learning and teaching

The anticipated class size should not exceed 20 students. The class will meet for three hours each week. Class time will be used for a combination of in class exercises, lectures, and applied discussions of case studies and/or research papers in the mathematical modelling of Operations and Supply Chain Management. There will also be a one hour weekly lab that will provide practice in the modelling tools covered in class. In additional to attending classes and labs, students should be prepared to spend about another five hours per week on activities related to this course. These activities include carrying out the required readings and class preparation activities, preparing assignments and the final project, and preparing for the final exam.

Teaching staff

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Learning resources

The recommended textbook for this course is: Powell, S.G., and K.R. Baker (2010) *Management Science: The Art of Modeling with Spreadsheets* (3rd Ed.). Wiley, NJ.

Online resources available via Canvas include PowerPoint presentations, assignment problems, and readings.

Assessment information

Assessment task	Weight %	Group and/or individual	Submission
Class participation	5%	Individual	During class time
Individual Assignments	25%	Individual	In class
Group assignment	20%	Group	In Class 12
Final Exam	50%	Individual	Exam venue

Pass requirements

Because assignments will be discussed in class, no late submissions can be accepted. Students must pass the final in order to pass the course.

Description of assessment tasks

Assessment task	Learning outcome to be assessed
Class participation	LO1, LO2, LO5
Individual assignments (3)	LO1, LO2, LO3, LO4
Group project	LO1, LO2, LO3, LO4, LO5, LO6
Final Exam (3 hours, covering the entire course)	LO1, LO2, LO3

Inclusive learning

Students are urged to discuss privately any impairment-related requirements face-to-face and/or in written form with the courses convenor/lecturer and/or tutor.

Academic integrity

The University of Auckland will not tolerate cheating, or assisting others to cheat, and views cheating in coursework as a serious academic offence. The work that a student submits for grading must be the student's own work, reflecting his or her learning. Where work from other sources is used, it must be properly acknowledged and referenced. This requirement also applies to sources on the worldwide web. A student's assessed work may be reviewed against electronic source material using computerised detection to provide an electronic version of their work for computerised review.

Student feedback

A survey is usually done in the first class to uncover and set expectations and mid-semester feedback is solicited to make any needed mid-course corrections. Feedback from previous years has been used to improve the course. In addition, the lecturer welcomes informal feedback on the course at any time.

In the event of an unexpected disruption

We undertake to maintain the continuity and standard of teaching and learning in all your courses throughout the year. If there are unexpected disruptions, the University has contingency plans to ensure that access to your course continues and your assessment is fair, and not compromised. Some adjustments may need to be made in emergencies, In the event of a disruption, the University and your course coordinators will make every effort to provide you with up to date information via Canvas and the University website.

Graduate profile for

The following six themes represent the capabilities that the Business School seeks to foster in all of its graduates. The development of these capabilities does not come all at once, but rather is expected to build from year to year. Each course is not expected to contribute to all capabilities, but each course will have its own goals and learning outcomes that relate to the overall development of this profile.

Graduate Profile

1. **Disciplinary knowledge and practice**

   Graduates will be able to apply highly specialised knowledge within the discipline to demonstrate an advanced awareness and understanding in a global context.

2. **Critical thinking**

   Graduates will be able to analyse and evaluate the relevant literature, and design and develop scholarly arguments that demonstrate advanced and diverse thinking.

3. **Solution seeking**

   Graduates will be able to creatively research and analyse complex issues, and develop innovative solutions.

4. **Communication and engagement**

   Graduates will be able to engage, communicate, and collaborate with diverse groups using multiple formats and effectively address a range of professional and academic audiences.

5. **Independence and integrity**

   Graduates will be able to demonstrate advanced independent thought, self-reflection, ethics, and integrity.

6. **Social and environmental responsibility**

   Graduates will consider, in relation to their discipline, the potential significance of the principles underpinning both the Treaty of Waitangi and sustainability.