

**Course Outline
2017**

OPSMGT 752: RESEARCH METHODS - MODELLING (15 POINTS)

Semester 2 (1175)

Course Prescription

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

Programme and Course Advice

Admission to the Operations and Supply Chain Management postgraduate programmes requires STAT 255. This course or equivalent is 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

By the end of this course it is expected that the student will be able to:

1. display familiarity with the major concepts and tools used in mathematical modelling;
2. be adept at understanding and managing the trade-off between modelling assumptions and tractability;
3. demonstrate critical and creative thinking in being able to formulate, justify, and evaluate models for operational decision making; and
4. 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.

Content Outline

Week 1:	Introduction to Modelling
Week 2:	Modelling uncertainty
Week 3:	Uncertainty and simulation
Week 4:	Uncertainty and queues

Week 5:	Discrete event simulation
Week 6:	Simulation continued
Week 7:	Optimisation models
Week 8:	Optimisation and uncertainty
Week 9:	Unstructured problem solving
Week 10:	Markov decision processes
Week 11:	Games and decisions
Week 12:	Wrap-up

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 addition 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

Professor Tava Olsen

Ports of Auckland Professor in Logistics and Supply Chain Management

Office: OGGB 429

Tel: 373-7599 (ext 85318)

Email: t.olsen@auckland.ac.nz

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

Class participation	5%
Individual Assignments	25%
Group assignment	20%
Final Exam (3 hours, covering the entire course)	50%
Total	100%

Further details on these assessments will be provided at our first lecture.

The broad relationship between assessments and the learning outcomes is as follows:

Learning Outcome	Individual Assignments	Class Participation	Group Assignment	Exam
1	x		X	x
2	x	x	X	x
3	x	x	X	x
4	x	x	X	

Inclusive Learning

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

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.