School of
Engineering and Computer Science
Te Kura Mātai Pūkaha, Pūrorohiko

COMP312 (2018) - Simulation and Stochastic Models

Prescription

Simulation and modelling of stochastic systems, covering examples from Operations Research and Computer Science, including queues, networks and computer systems. Design, analysis and validation of simulation experiments. Previous experience with computer programming is required before starting this course.

Course learning objectives

Students who pass this course should be able to:

1. Use an appropriate queue or queueing network to model a given service facility or congestion situation.
2. Build simulation models of practical networks and systems.
3. Design, analyse and validate simulation experiments.
4. Evaluate and optimise performance characteristics of queues and queueing networks.

Course content

Simulation topics from:

- Discrete-event computer simulation
- The SimPy simulation language
- Simulation model structures
- Simulation experiments and analysing simulation output

Stochastic Models topics from:

- The Poisson process, the Erlang, Coxian, and Phase-type distributions
- Little's Law for queue models
- Steady-state solution and performance measures of M/M/1 queue
- Queues of different types: multi- and infinite-server, finite capacity
- Numerical solutions for steady-state Markovian queues
- M/G/1 queues: the Pollaczek-Khintchine formula
- Jackson-type queue networks
- Closed queue networks: the MVA method of solution

Withdrawal from Course

Withdrawal dates and process:
https://www.victoria.ac.nz/students/study/course-additions-withdrawals

Lecturers

Stefanka Chukova (Coordinator)

Stefanka.Chukova@vuw.ac.nz 04 4636786
535 Cotton, Kelburn

Teaching Format

During the trimester there will be lectures, tutorials, laboratories and practical work.

Student feedback

Student feedback on University courses may be found at:
www.cad.vuw.ac.nz/feedback/feedback_display.php

Dates (trimester, teaching & break dates)

- Teaching: 05 March 2018 - 08 June 2018
- Break: 23 April 2018 - 27 April 2018
- Study period: 11 June 2018 - 14 June 2018
- Exam period: 15 June 2018 - 04 July 2018

Class Times and Room Numbers

05 March 2018 - 25 March 2018

- **Thursday** 15:10 - 16:00 – 120, Easterfield, Kelburn

05 March 2018 - 01 April 2018

- **Monday** 15:10 - 16:00 – 103, Murphy, Kelburn
- **Tuesday** 15:10 - 16:00 – 120, Easterfield, Kelburn
- **Wednesday** 15:10 - 16:00 – 238, Cotton, Kelburn

02 April 2018 - 22 April 2018

- **Thursday** 15:10 - 16:00 – 120, Easterfield, Kelburn

09 April 2018 - 22 April 2018

- **Monday** 15:10 - 16:00 – 103, Murphy, Kelburn
- **Tuesday** 15:10 - 16:00 – 120, Easterfield, Kelburn
- **Wednesday** 15:10 - 16:00 – 238, Cotton, Kelburn

30 April 2018 - 10 June 2018

- **Monday** 15:10 - 16:00 – 103, Murphy, Kelburn
- **Tuesday** 15:10 - 16:00 – 120, Easterfield, Kelburn
- **Wednesday** 15:10 - 16:00 – 238, Cotton, Kelburn
- **Thursday** 15:10 - 16:00 – 120, Easterfield, Kelburn

Set Texts and Recommended Readings

Required

There are no required texts for this offering.

Mandatory Course Requirements

In addition to achieving an overall pass mark of at least 50%, students must:

- The project must be completed and a satisfactory level of attainment gained.
- A mark of at least 30% must be achieved in the queueing part of the final examination.
- A mark of at least 30% must be achieved in the practical part of the final examination.

If you believe that exceptional circumstances may prevent you from meeting the mandatory course requirements, contact the Course Coordinator for advice as soon as possible.

Assessment

Assessment is based on the maximum of the following:

- 75% exam plus 25% for the project; or
- 50% exam, 15% project, 15% assignments plus 20% quizzes.

In-course quizzes (4 worth 5% each)	CLO: 1,2,3,4	20%
9 Weekly assignments	CLO: 1,2,3,4	15%
Project	CLO: 1,2,3,4	15%
Final examination (2 hours) in addition to an in-course (1 hour) practical exam.	CLO: 1,2,3,4	50%

Penalties

Late or missing assignments or quizzes will receive a mark of zero, because model answers are given out, unless illness, bereavement or other substantial causes occur and have been discussed with the course coordinator and proper documentation (e.g. a medical certificate) has been provided.

Extensions

Extensions will only be given in exceptional circumstances. Please communicate these circumstances to the course coordinator

Submission & Return

Written assignments should be handed in to the 3rd Floor of Cotton Building in the hand-in boxes. Please ensure you staple your assignment and attach a cover sheet on the front. Marked assignments can be collected from the School Office on the 3rd Floor of Cotton Building. See the page: http://sms.victoria.ac.nz/Main/MarkedAssignments for assignment collection times.

Group Work

Each student will be assigned to a team project. The completion of the project will require knowledge from both queueing theory and simulation. The assessment will be based on a group report and written individual reports. These should include evidence of understanding the ideas involved, provide a summary of the simulation work done and an interpretation of the results obtained. Each team will give an oral presentation (20-25 minutes long) to the class and invited SMS staff.

Workload

Although the workload will vary from week to week, you should expect to spend approximately 10 hours per week on the course to give a total of 150 hours study time for the course.

Teaching Plan

Communication of Additional Information

All online material for this course can be accessed at https://ecs.victoria.ac.nz/Courses/COMP312_2018T1

Links to General Course Information

- Academic Integrity and Plagiarism: https://www.victoria.ac.nz/students/study/exams/integrity-plagiarism
- Academic Progress: https://www.victoria.ac.nz/students/study/progress/academic-progess (including restrictions and non-engagement)
- Dates and deadlines: https://www.victoria.ac.nz/students/study/dates

- Grades: https://www.victoria.ac.nz/students/study/progress/grades
- Special passes: Refer to the Assessment Handbook, at https://www.victoria.ac.nz/documents/policy/staff-policy/assessment-handbook.pdf
- Statutes and policies, e.g. Student Conduct Statute: https://www.victoria.ac.nz/about/governance/strategy
- Student support: https://www.victoria.ac.nz/students/support
- Students with disabilities: https://www.victoria.ac.nz/st_services/disability/
- Student Charter: https://www.victoria.ac.nz/learning-teaching/learning-partnerships/student-charter
- Terms and Conditions: https://www.victoria.ac.nz/study/apply-enrol/terms-conditions/student-contract
- Turnitin: http://www.cad.vuw.ac.nz/wiki/index.php/Turnitin
- University structure: https://www.victoria.ac.nz/about/governance/structure
- VUWSA: http://www.vuwsa.org.nz

Offering CRN: 10444

Points: 15
Prerequisites: COMP 102 or 112, one course from (MATH 177, 277, STAT 292, ENGR 123), 15 further 200-level COMP, MATH, NWEN, OPRE, STAT or SWEN pts;
Duration: 05 March 2018 - 04 July 2018
Starts: Trimester 1
Campus: Kelburn