



MONASH University
Information Technology

FIT5011
Network design and performance

Unit Guide

Semester 2, 2014

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FIT5011 Network design and performance - Semester 2, 2014

This unit will cover network design, performance modelling and analysis. Queuing models (M/M/1, M/M/k, M/M/k/k, M/G/1), networks of queues. Multi-access systems (splitting, reservation, carrier sensing), routing techniques (shortest path, Bellman-Ford, Dijkstra, adaptive routing, flooding). Quality of service (QoS) aspects, flow control, connection admission control and other traffic management functions - ATM, IntServ and DiffServ models. Network topology design and performance modelling, design considerations for local or wide area networks, including GEPON, cable and wireless networks. Introductory probability and graph theory.

Mode of Delivery

Caulfield (Day)

Workload Requirements

Minimum total expected workload equals 12 hours per week comprising:

(a.) Contact hours for on-campus students:

- Two hours of lectures
- One 2-hour tutorial

(b.) Additional requirements (all students):

- A minimum of 8 hours independent study per week for completing lab and project work, private study and revision.

Unit Relationships

Prerequisites

([FIT5131](#) or [FIT9017](#)) and ([FIT5134](#) or [FIT9018](#)) and ([FIT5132](#) or [FIT9003](#) or [FIT9019](#)) and ([FIT5135](#) or [FIT9020](#)) and ([FIT5136](#) or [FIT4037](#)) and ([FIT5130](#) or [FIT9030](#)) or equivalent

Basic network systems knowledge, understanding of probability theory.

Chief Examiner

[Dr Carlo Kopp](#)

Campus Lecturer

Caulfield

Dr Carlo Kopp

Consultation hours: By appointment (part time)

Your feedback to Us

Monash is committed to excellence in education and regularly seeks feedback from students, employers and staff. One of the key formal ways students have to provide feedback is through the Student Evaluation of Teaching and Units (SETU) survey. The University's student evaluation policy requires that every unit is evaluated each year. Students are strongly encouraged to complete the surveys. The feedback is anonymous and provides the Faculty with evidence of aspects that students are satisfied and areas for improvement.

For more information on Monash's educational strategy, see:

www.monash.edu.au/about/monash-directions/ and on student evaluations, see:
www.policy.monash.edu/policy-bank/academic/education/quality/student-evaluation-policy.html

Previous Student Evaluations of this Unit

This is a new unit being constructed by merging CSE5805 and CSE5808 and updating materials where appropriate.

If you wish to view how previous students rated this unit, please go to
<https://emuapps.monash.edu.au/unitevaluations/index.jsp>

Academic Overview

Learning Outcomes

At the completion of this unit students should be able to:

- explain and construct queuing models for performance modelling of networks;
- explain multi-access systems including splitting, reservation, and carrier sensing;
- explain analysis of routing protocols commonly used on the Internet;
- explain and apply traffic dimensioning for circuit and packet switched networks, including VoIP and multimedia;
- explain and apply design considerations for local or wide area networks, including GEPON, cable and wireless networks;
- explain the analysis and evaluation of the operation of a local or wide area telecommunications network.

Unit Schedule

Week	Activities	Assessment
0	Please note schedule is subject to change throughout semester, as the unit is still being constructed	No formal assessment or activities are undertaken in week 0
1	Introduction, Design Considerations in Networks, QoS Parameters	Tutorial
2	Probability Theory Revision, Correlation	Tutorial
3	Physical Layer Design: Noise, Modulation, Shannon, Power Budgets	Tutorial; Class Test 1
4	Physical Layer Design: Copper Cable, Fibre and Radiofrequency Links	Tutorial
5	Markov Chains and Queues	Tutorial
6	Circuit vs Packet Switched Systems; Erlang Formulas	Tutorial
7	Contention Based Multiaccess Systems (Ethernet, ALOHA models)	Tutorial
8	Traffic Modelling; Self-Similarity and Burstiness Properties	Tutorial
9	Graph Theory Revision; Application of Graph Theory to Networks	Tutorial
10	Routing and Route Discovery Algorithms	Tutorial; Class Test 2
11	Networks of Queues, Multidimensional Queues, Network topology design	Tutorial; Assignment 1 due on Friday, 4PM
12	QoS Models and Implementations; ATM, IntServ and DiffServ models	Tutorial
	SWOT VAC	No formal assessment is undertaken in SWOT VAC
	Examination period	LINK to Assessment Policy: http://policy.monash.edu.au/policy-bank/academic/education/assessment/assessment-in-coursework-policy.html

*Unit Schedule details will be maintained and communicated to you via your learning system.

Teaching Approach

Lecture and tutorials or problem classes

This teaching and learning approach helps students to initially encounter information at lectures, discuss and explore the information during tutorials, and practice in a hands-on lab environment.

Assessment Summary

Examination (3 hours): 50%; In-semester assessment: 50%

Assessment Task

Value

Due Date

Unit Schedule

Assignment 1	20%	Week 11
Class Tests 1 and 2	10% (5% for each test)	Tests held during tutorials in Weeks 3 and 10
Tutorials	20% (approx 1.8% each tutorial)	End of weekly tutorial class
Examination 1	50%	To be advised

Assessment Requirements

Assessment Policy

Faculty Policy - Unit Assessment Hurdles

(<http://intranet.monash.edu.au/infotech/resources/staff/edgov/policies/assessment-examinations/assessment-hurdles>)

Academic Integrity - Please see resources and tutorials at

<http://www.monash.edu/library/skills/resources/tutorials/academic-integrity/>

Assessment Tasks

Participation

Attendance in all lectures and tutorials is highly recommended, as the unit is mathematically intensive, and lectures mostly build on previous lecture content.

• Assessment task 1

Title:

Assignment 1

Description:

The assignment will involve capture and analysis of network traffic, and associated report writing. Specific details will be determined during semester.

Weighting:

20%

Criteria for assessment:

Student must demonstrate good command of the material and produce correct results. The work must be original - collaborative work is not acceptable. Evidence of plagiarism, copying or other forms of non-examination cheating will result in the work being disallowed.

Due date:

Week 11

• Assessment task 2

Title:

Class Tests 1 and 2

Description:

Probability theory test; Graph theory test.

Weighting:

10% (5% for each test)

Criteria for assessment:

Student must demonstrate good command of the material and produce correct results. The work must be original - collaborative work is not acceptable. Evidence of plagiarism, copying or other forms of non-examination cheating will result in the work being disallowed.

Due date:

Tests held during tutorials in Weeks 3 and 10

- **Assessment task 3**

Title:

Tutorials

Description:

Weekly tutorial covering lecture content from preceding week. Students will be required to solve problems.

Weighting:

20% (approx 1.8% each tutorial)

Criteria for assessment:

Student must demonstrate good command of the material and produce correct results. The work must be original - collaborative work is not acceptable. Evidence of plagiarism, copying or other forms of non-examination cheating will result in the work being disallowed.

Due date:

End of weekly tutorial class

Examinations

- **Examination 1**

Weighting:

50%

Length:

3 hours

Type (open/closed book):

Closed book

Electronic devices allowed in the exam:

Non-programmable scientific calculator

Learning resources

Reading list

Reading list items for specific lecture topics will be listed in the slides for that topic

Monash Library Unit Reading List (if applicable to the unit)

<http://readinglists.lib.monash.edu/index.html>

Faculty of Information Technology [Style Guide](#)

Feedback to you

Examination/other end-of-semester assessment feedback may take the form of feedback classes, provision of sample answers or other group feedback after official results have been published. Please check with your lecturer on the feedback provided and take advantage of this prior to requesting individual consultations with staff. If your unit has an examination, you may request to view your examination script booklet, see

<http://intranet.monash.edu.au/infotech/resources/students/procedures/request-to-view-exam-scripts.html>

Types of feedback you can expect to receive in this unit are:

Assessment Requirements

- Informal feedback on progress in labs/tutes
- Graded assignments with comments
- Test results and feedback

Extensions and penalties

Submission must be made by the due date otherwise penalties will be enforced.

You must negotiate any extensions formally with your campus unit leader via the in-semester special consideration process: <http://www.monash.edu.au/exams/special-consideration.html>

Returning assignments

Students can expect assignments to be returned within two weeks of the submission date or after receipt, whichever is later.

Resubmission of assignments

Assignment resubmission is not permitted. No penalty late submissions will be offered where illness or other circumstances consistent with university policy may have occurred.

Assignment submission

It is a University requirement

(<http://www.policy.monash.edu/policy-bank/academic/education/conduct/student-academic-integrity-managing-pla>) for students to submit an assignment coversheet for each assessment item. Faculty Assignment coversheets can be found at <http://www.infotech.monash.edu.au/resources/student/forms/>. Please check with your Lecturer on the submission method for your assignment coversheet (e.g. attach a file to the online assignment submission, hand-in a hard copy, or use an online quiz). Please note that it is your responsibility to retain copies of your assessments.

Online submission

If Electronic Submission has been approved for your unit, please submit your work via the learning system for this unit, which you can access via links in the my.monash portal.

Technological Requirements

Announcements will be made via Moodle; students are permitted but not required to bring notebooks, laptops and tablets into classes.

Recommended Resources

OpNet software (free student edition).

Recommended text(s)

Erwin Kreyszig. (2010). *Advanced Engineering Mathematics*. (10th Edition) John Wiley & Sons, Inc.

Thomas G. Robertazzi. (2000). *Computer Networks and Systems: Queueing Theory and Performance Evaluation*. (1st Edition) Springer Verlag.

Examination material or equipment

Non programmable scientific calculator.

Other Information

Policies

Monash has educational policies, procedures and guidelines, which are designed to ensure that staff and students are aware of the University's academic standards, and to provide advice on how they might uphold them. You can find Monash's Education Policies at:

www.policy.monash.edu.au/policy-bank/academic/education/index.html

Key educational policies include:

- Student Academic Integrity Policy and Student Academic Integrity: Managing Plagiarism and Collusion Procedures ;
<http://www.policy.monash.edu/policy-bank/academic/education/conduct/student-academic-integrity-policy.h>
- Assessment in Coursework Programs;
<http://www.policy.monash.edu/policy-bank/academic/education/assessment/assessment-in-coursework-po>
- Special Consideration;
<http://www.policy.monash.edu/policy-bank/academic/education/assessment/special-consideration-policy.ht>
- Grading Scale;
<http://www.policy.monash.edu/policy-bank/academic/education/assessment/grading-scale-policy.html>
- Discipline: Student Policy;
<http://www.policy.monash.edu/policy-bank/academic/education/conduct/student-discipline-policy.html>
- Academic Calendar and Semesters; <http://www.monash.edu.au/students/dates/>
- Orientation and Transition; <http://intranet.monash.edu.au/infotech/resources/students/orientation/>
- Academic and Administrative Complaints and Grievances Policy;
<http://www.policy.monash.edu/policy-bank/academic/education/management/complaints-grievance-policy.h>

Faculty resources and policies

Important student resources including Faculty policies are located at

<http://intranet.monash.edu.au/infotech/resources/students/>

Graduate Attributes Policy

<http://www.policy.monash.edu/policy-bank/academic/education/management/monash-graduate-attributes-policy.h>

Student Charter

www.opq.monash.edu.au/ep/student-charter/monash-university-student-charter.html

Student services

The University provides many different kinds of support services for you. Contact your tutor if you need advice and see the range of services available at <http://www.monash.edu.au/students>. For Malaysia see <http://www.monash.edu.my/Student-services>, and for South Africa see <http://www.monash.ac.za/current/>.

Monash University Library

The Monash University Library provides a range of services, resources and programs that enable you to save time and be more effective in your learning and research. Go to www.lib.monash.edu.au or the library tab in [my.monash](#) portal for more information. At Malaysia, visit the Library and Learning Commons at <http://www.lib.monash.edu.my/>. At South Africa visit <http://www.lib.monash.ac.za/>.

Disability Liaison Unit

Students who have a disability or medical condition are welcome to contact the Disability Liaison Unit to discuss academic support services. Disability Liaison Officers (DLOs) visit all Victorian campuses on a regular basis.

- Website: <http://www.monash.edu/equity-diversity/disability/index.html>
- Telephone: 03 9905 5704 to book an appointment with a DLO; or contact the Student Advisor, Student Community Services at 03 55146018 at Malaysia
- Email: dlu@monash.edu
- Drop In: Equity and Diversity Centre, Level 1, Building 55, Clayton Campus, or Student Community Services Department, Level 2, Building 2, Monash University, Malaysia Campus