



ITEC803

Advanced Topics in Computer Networks

S1 Evening 2016

Dept of Computing

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General Information

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By agreement

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Credit points

4

Prerequisites

ITEC647

Corequisites

Co-badged status

Unit description

This unit aims to address various advanced aspects of networking, particularly the current and emerging research topics in network. The focus will be on material drawn from the recent research literature. Topics include but are not limited to label switching, VPN architectures, Inter-domain routing, advanced multicast routing models, traffic engineering, congestion control, quality of service, and multimedia networks. The unit consists of lecture, reading, discussion and assignment components.

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at <https://www.mq.edu.au/study/calendar-of-dates>

Learning Outcomes

On successful completion of this unit, you will be able to:

Understand the key technologies for each network layer.

Analyse and Design network architectures.

Understand the key concepts, techniques and mechanisms in networking such as addressing, routing, multicast, label switching and TCP.

Review key issues related to Software Defined Networks

Understand the design and analysis of real time multimedia networks.

Assessment Tasks

Name	Weighting	Due
Quiz 1	10%	Week 4
Quiz 2	10%	Week 8
Class presentation	10%	Once during the unit
Assignment	30%	Week 12
Final Exam	40%	TBA

Quiz 1

Due: **Week 4**

Weighting: **10%**

Quiz 1 is online and closed book and will be based on lecture material for Weeks 1-4.

On successful completion you will be able to:

- Understand the key technologies for each network layer.
- Analyse and Design network architectures.
- Understand the key concepts, techniques and mechanisms in networking such as addressing, routing, multicast, label switching and TCP.

Quiz 2

Due: **Week 8**

Weighting: **10%**

Quiz 2 is online and closed book and will be based on lecture material for Weeks 5-8.

On successful completion you will be able to:

- Understand the key technologies for each network layer.
- Analyse and Design network architectures.
- Understand the key concepts, techniques and mechanisms in networking such as addressing, routing, multicast, label switching and TCP.

Class presentation

Due: **Once during the unit**

Weighting: **10%**

During the unit, each student will undertake a review and analysis of one item from the reading material list, and then make a 30 minute presentation to the class demonstrating their understanding of the topic area.

On successful completion you will be able to:

- Review key issues related to Software Defined Networks
- Understand the design and analysis of real time multimedia networks.

Assignment

Due: **Week 12**

Weighting: **30%**

The assignment will be defined in iLearn and will have a research and analysis component. This is an individual assignment and you must attempt it independently.

On successful completion you will be able to:

- Review key issues related to Software Defined Networks
- Understand the design and analysis of real time multimedia networks.

Final Exam

Due: **TBA**

Weighting: **40%**

An examination allows us to individually and securely assess student's mastery of the coursework material. The examination material will be covered by learning outcomes #1 to #5. The examination will be closed book and three (3) hours in length

Regarding the examination process, note that

§ you must attend all required classes and submit all required assessment, otherwise the Executive Dean of the Faculty or delegated authority has the power to refuse permission to attend the final examination

§ you are expected to present yourself for examination at the time and place designated in the [University Examination Timetable](#)

§ the timetable will be available in Draft form approximately eight weeks before the commencement of the examinations and in Final form approximately four weeks before the commencement of examinations

§ no early examinations for individuals or groups of students will be set. All students are expected to ensure that they are available until the end of the teaching semester, that is the final day of the official examination period

§ the only exception to not sitting an examination at the designated time is because of documented illness or unavoidable disruption. In these circumstances you may wish to consider applying for [Special Consideration](#).

On successful completion you will be able to:

- Understand the key technologies for each network layer.
- Analyse and Design network architectures.
- Understand the key concepts, techniques and mechanisms in networking such as addressing, routing, multicast, label switching and TCP.
- Review key issues related to Software Defined Networks
- Understand the design and analysis of real time multimedia networks.

Delivery and Resources

ITEC803 is taught via lectures and informal tutorial sessions. During the course there will be **some** practical slots available for students to work on various networking routing labs using Cisco routers.

Classes

Classes are held from 6-10pm Tuesday evenings. Lectures and discussions are in W6B386. There will also be some practical work (Cisco Labs) in E6A240.

Lectures

Lectures are used to explore advanced computer network technologies and design and put them in a wider context. You are encouraged to ask questions of the lecturer, both during and outside the lecture, to clarify anything you might not be sure of. There will be industry-based guest lectures to provide up-to-date information and Q&A.

It should be noted that no single text book completely covers the content of this unit. A large portion of the lecture material is drawn from the Internet standard documents called the "Request For Comments" or RFC. Students are encouraged to read RFCs of relevant topics to gain a solid understanding of the topics that are covered.

Quizzes

There will be two quizzes in the following weeks: 4 and 8. A quiz is a short test that will be based on your previously covered lecture material. For example, week 4 quiz will be based on lectures done in weeks 1-4. The quizzes will be online through iLearn. These quizzes contribute 20% of the total mark and serve as a feedback mechanism to monitor your progress in the unit.

Tutorial

The tutorial gives you the opportunity to interact with your peers and with the lecturer. The

tutorial sessions involve informal discussions with your peers and the lecturer. On some weeks, you will be given problems to solve prior to the tutorial; preparing solutions is important because it will allow you to discuss the problems effectively with your lecturer and maximise the feedback you get on your work.

Assignments

Your assignment is to be submitted via iLearn. Late submission of the assignment will be accepted, but penalised at the rate of 10% per day late. If you cannot submit assignments on time because of illness or other circumstances, please contact the convenor at the earliest possible time.

Practicals

Practical classes give you an opportunity to solve practical problems in computer networking such as router configuration. In these classes you will be given a number of problems to work on; it is important that you keep up with these problems as doing so will help you understand the material in the unit and prepare you for the work in assignments. The balance between tutorial and practical problems may vary from week to week.

Practical classes will not be held every week (please see the Weekly Updates on the unit web site on iLearn for more information).

General Notes

In this unit, you should do the following:

- Attend lectures, take notes, ask questions.
- Attend your tutorial, seek feedback from your lecturer on your work.
- Prepare for and strive to do well in the two quizzes.
- Read appropriate sections of the text, add to your notes and prepare questions for your lecturer/tutor.
- Prepare answers to tutorial questions.
- Work on any assignments that have been released.
- Participate Practicals and associate theory with practice.

Lecture notes will be made available each week, after the lecture has finished, but these notes are intended as an outline of the lecture only and are not a substitute for your own notes or the textbook.

Optional Recommended Texts

Text

[C] D. Comer *Computer Networks and Internet* 5th Edition. Prentice Hall 2009.

OR

[C] D. Comer, *Internetworking with TCP/IP*, vol. 1, 6th Edition, Prentice Hall 2006.

Other Useful Books

[T] A.S. Tanenbaum and D. J. Wetherall., *Computer Networks*, Prentice Hall, 5th Edition. Pearson Education, 2010.

[KR] J.F. Kurose and K.W. Ross, *Computer Networking: A Top Down Approach*, 6th Edition. Prentice Hall 2012.

[BDC] W. Stallings, *Business Data Communications*, 5th Edition, Prentice Hall 2001.

[O] P. Oppenheimer, *Top-Down Network Design*, 3rd Edition, Cisco Press 2011.

Technology Used and Required

Cisco router lab will be used for all the routing practicals.

Network Protocol Analyser (Wireshark) will be used for protocol analysis practicals.

Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central](#). Students should be aware of the following policies in particular with regard to Learning and Teaching:

Academic Honesty Policy http://mq.edu.au/policy/docs/academic_honesty/policy.html

New Assessment Policy in effect from Session 2 2016 http://mq.edu.au/policy/docs/assessment/policy_2016.html. For more information visit http://students.mq.edu.au/events/2016/07/19/new_assessment_policy_in_place_from_session_2/

Assessment Policy prior to Session 2 2016 <http://mq.edu.au/policy/docs/assessment/policy.html>

Grading Policy prior to Session 2 2016 <http://mq.edu.au/policy/docs/grading/policy.html>

Grade Appeal Policy <http://mq.edu.au/policy/docs/gradeappeal/policy.html>

Complaint Management Procedure for Students and Members of the Public http://www.mq.edu.au/policy/docs/complaint_management/procedure.html

Disruption to Studies Policy http://www.mq.edu.au/policy/docs/disruption_studies/policy.html *The Disruption to Studies Policy is effective from March 3 2014 and replaces the Special Consideration Policy.*

In addition, a number of other policies can be found in the [Learning and Teaching Category](#) of Policy Central.

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/support/student_conduct/

Results

Results shown in *iLearn*, or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in [eStudent](#). For more information visit ask.mq.edu.au.

Student Support

Macquarie University provides a range of support services for students. For details, visit <http://students.mq.edu.au/support/>

Learning Skills

Learning Skills (mq.edu.au/learningskills) provides academic writing resources and study strategies to improve your marks and take control of your study.

- [Workshops](#)
- [StudyWise](#)
- [Academic Integrity Module for Students](#)
- [Ask a Learning Adviser](#)

Student Services and Support

Students with a disability are encouraged to contact the [Disability Service](#) who can provide appropriate help with any issues that arise during their studies.

Student Enquiries

For all student enquiries, visit Student Connect at ask.mq.edu.au

IT Help

For help with University computer systems and technology, visit http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/.

When using the University's IT, you must adhere to the [Acceptable Use of IT Resources Policy](#). The policy applies to all who connect to the MQ network including students.

Graduate Capabilities

PG - Discipline Knowledge and Skills

Our postgraduates will be able to demonstrate a significantly enhanced depth and breadth of

knowledge, scholarly understanding, and specific subject content knowledge in their chosen fields.

This graduate capability is supported by:

Learning outcomes

- Understand the key technologies for each network layer.
- Analyse and Design network architectures.
- Understand the key concepts, techniques and mechanisms in networking such as addressing, routing, multicast, label switching and TCP.
- Review key issues related to Software Defined Networks
- Understand the design and analysis of real time multimedia networks.

Assessment tasks

- Quiz 1
- Quiz 2
- Class presentation
- Assignment
- Final Exam

PG - Critical, Analytical and Integrative Thinking

Our postgraduates will be capable of utilising and reflecting on prior knowledge and experience, of applying higher level critical thinking skills, and of integrating and synthesising learning and knowledge from a range of sources and environments. A characteristic of this form of thinking is the generation of new, professionally oriented knowledge through personal or group-based critique of practice and theory.

This graduate capability is supported by:

Learning outcomes

- Understand the key technologies for each network layer.
- Analyse and Design network architectures.
- Understand the key concepts, techniques and mechanisms in networking such as addressing, routing, multicast, label switching and TCP.
- Review key issues related to Software Defined Networks
- Understand the design and analysis of real time multimedia networks.

Assessment tasks

- Class presentation
- Assignment
- Final Exam

PG - Research and Problem Solving Capability

Our postgraduates will be capable of systematic enquiry; able to use research skills to create new knowledge that can be applied to real world issues, or contribute to a field of study or practice to enhance society. They will be capable of creative questioning, problem finding and problem solving.

This graduate capability is supported by:

Learning outcomes

- Understand the key technologies for each network layer.
- Analyse and Design network architectures.
- Understand the key concepts, techniques and mechanisms in networking such as addressing, routing, multicast, label switching and TCP.
- Review key issues related to Software Defined Networks
- Understand the design and analysis of real time multimedia networks.

Assessment tasks

- Quiz 1
- Quiz 2
- Class presentation
- Assignment
- Final Exam

PG - Effective Communication

Our postgraduates will be able to communicate effectively and convey their views to different social, cultural, and professional audiences. They will be able to use a variety of technologically supported media to communicate with empathy using a range of written, spoken or visual formats.

This graduate capability is supported by:

Assessment task

- Class presentation

Standards

Four standards, namely HD, D, CR, P summarize as many different levels of achievement. Each standard is precisely defined to help students know what kind of performance is expected to deserve a certain mark. The standards corresponding to the sample learning outcomes of this unit are given below:

L.O	P	CR	D	HD
L.O.#1				
Understand the key technologies for each network layer.	Provide basic description and definitions of layer network architecture	Describe across most of the topics in layered network architecture and implementations.	Discuss with breadth across most of the topics in layered network architecture and implementations	Discuss with breadth and depth across most of the topics in layered network architecture and implementations
L.O. #2				
Competence in analysis of network protocols.	Perform basic analysis of network protocols	Perform detailed analysis of network protocols	Perform advanced analysis of network protocol	Demonstrate indepth analysis of network protocols
L.O. #3				
Understand the key concepts, techniques and mechanisms in networking such as addressing, routing, multicast and TCP.	Describe and apply limited set of the key networking concepts and mechanisms.	Discuss some of the key networking concepts and mechanisms.	Discuss most of the key networking concepts and mechanisms.	Discuss and apply most of the networking concepts and mechanisms.
L.O. #4				
Appreciate key issues related to network security and application layer design.	Describe limited set of key issues related to network security and application layer design	Explain some of the key issues related to network security and application layer design	Explain most of the key issues related to network security and application layer design	Discuss in depth all of the key issues related to network security and application layer design
L.O. #5				
Competence in analysis and evaluation of significant applications of networks.	Analyze and evaluate limited set of significant network applications	Analyze and evaluate limited set of significant network applications	Analyze and evaluate limited set of significant network applications	Analyze and evaluate limited set of significant network applications

Grading

At the end of the semester, you will receive a grade that reflects your achievement in the unit

- **Fail (F):** does not provide evidence of attainment of all learning outcomes. There is missing or partial or superficial or faulty understanding and application of the fundamental concepts in the field of study; and incomplete, confusing or lacking communication of ideas in ways that give little attention to the conventions of the discipline.
- **Pass (P):** provides sufficient evidence of the achievement of learning outcomes. There is demonstration of understanding and application of fundamental concepts of the field of study; and communication of information and ideas adequately in terms of the conventions of the discipline. The learning attainment is considered satisfactory or

adequate or competent or capable in relation to the specified outcomes.

- **Credit (Cr):** provides evidence of learning that goes beyond replication of content knowledge or skills relevant to the learning outcomes. There is demonstration of substantial understanding of fundamental concepts in the field of study and the ability to apply these concepts in a variety of contexts; plus communication of ideas fluently and clearly in terms of the conventions of the discipline.
- **Distinction (D):** provides evidence of integration and evaluation of critical ideas, principles and theories, distinctive insight and ability in applying relevant skills and concepts in relation to learning outcomes. There is demonstration of frequent originality in defining and analysing issues or problems and providing solutions; and the use of means of communication appropriate to the discipline and the audience.
- **High Distinction (HD):** provides consistent evidence of deep and critical understanding in relation to the learning outcomes. There is substantial originality and insight in identifying, generating and communicating competing arguments, perspectives or problem solving approaches; critical evaluation of problems, their solutions and their implications; creativity in application.

In this unit, your final grade depends on your performance in each part of the assessment. For each task, you receive a mark that combines your standard of performance regarding each learning outcome assessed by this task. Then the different component marks are added up to determine your total mark out of 100. Your grade then depends on this total mark and your overall standards of performance.

Concretely, in order to pass the unit, you must

- obtain a total mark of 50% or higher and a mark of 40% or higher in the final examination;
- make a reasonable attempt at the exercises in the assessment tasks;
- demonstrate that you can perform at a Functional level or higher for each criterion assessed in the two assignments;
- reach a Functional level or higher for each criterion assessed in the final examination.

Students obtaining a higher grade than a pass in this unit will (in addition to the above)

- have a total mark of 85% or higher and perform at distinction level or higher in the final examination to obtain High Distinction;
- have a total mark of 75% or higher and perform at credit level or higher in the final examination to obtain Distinction;
- have a total mark of 65% or higher and perform at pass level but with 50% or higher in the final examination to obtain Credit.

