ITEC803

Advanced Topics in Computer Networks

S1 Evening 2018

Dept of Computing

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General Information

Unit convenor and teaching staff
Adjunct Lecturer
Milton Baar
milton.baar@mq.edu.au
Contact via 04 1927 9847
By agreement

Credit points
4

Prerequisites
ITEC647 or admission to MCyberSec with a specialisation in Internetworking

Corequisites

Co-badged status
comp703

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 and security.

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 and network security

Understand the design and analysis of real time multimedia networks.

Assessment Tasks

Name	Weighting	Hurdle	Due
Quiz 1	10%	No	Week 4
Quiz 2	10%	No	Week 8
Class presentation	10%	No	Once during the unit
Assignment	30%	No	Week 12
Final Exam	40%	Yes	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 and security.
- 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 and security.
- 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 and network security
- 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 and network security
- Understand the design and analysis of real time multimedia networks.

Final Exam

Due: **TBA**
Weighting: **40%**
This is a hurdle assessment task (see assessment policy for more information on hurdle assessment tasks)

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. It is held in the usual examination period of the semester. Students have 3 hours written time plus 10 minutes reading time to complete the sections of the exam.

This is a hurdle assessment: Students must obtain at least 50% in the final exam to be eligible to pass the unit. Students obtaining between 40% and 50% in the first attempt will be automatically given a second attempt to pass the hurdle requirement.

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 and security.
- 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 and network security
- 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 **may** be practical slots available for students to work on various networking routing labs using Cisco routers, but practical work is not a part of the unit design.

Classes

Classes are held from 6-10pm Tuesday evenings in 04WR 335.

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.

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; these notes are intended as an outline of the lecture and are intended to be a companion to your own notes and the other reading material.

Optional Recommended Texts

Text

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

OR

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

Other Useful Books

A.S. Tanenbaum and D. J. Wetherall., *Computer Networks*, Prentice Hall, 5th Edition. Pearson

Education, 2010.

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

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

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

Technology Used and Required

You may provide your own technology to read course material.

Unit Schedule

Week	Topic
1	Course overview
2	BGP - interdomain routing protocol
3	RIP and OSPF
4	MPLS part 1
5	MPLS part 2
6	Multicast DNS
7	Realtime networking
8	Mobile networks part 1
9	Mobile networks part 2
10	Introduction to QoS
11	IntServ/DiffServ
12	Introduction to cryptography
13	Course conclusion and exam review

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central (https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- Academic Appeals Policy
- Academic Integrity Policy
- Academic Progression Policy

- Assessment Policy
- Fitness to Practice Procedure
- Grade Appeal Policy
- Complaint Management Procedure for Students and Members of the Public
- Special Consideration Policy *(**Note:** The Special Consideration Policy is effective from 4 December 2017 and replaces the Disruption to Studies Policy.)*

Undergraduate students seeking more policy resources can visit the Student Policy Gateway (https://students.mq.edu.au/support/study/student-policy-gateway). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

If you would like to see all the policies relevant to Learning and Teaching visit Policy Central (https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/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/study/getting-started/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.

Disruption

If you apply for Disruption to Study for your final examination, you must make yourself available for the week of July 24 – 28, 2017. If you are not available at that time, there is no guarantee an additional examination time will be offered. Specific examination dates and times will be determined at a later date.

Second-chance hurdle examinations

Second-chance hurdle examinations will also be offered in the week of July 24 - 28. Results will be released on July 13. You will be notified shortly after that date of your eligibility for a hurdle retry and you must also make yourself available during that week to take advantage of this opportunity.

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 and security.
- 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 and network security
- 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 and security.
- 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 and network security
- 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 and security.
- 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 and network security
- 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 summarise 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 in-depth 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.	Analyse and evaluate limited set of significant network applications	Analyse and evaluate limited set of significant network applications	Analyse and evaluate limited set of significant network applications	Analyse 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.

In order to pass the unit, you must obtain a total mark of 50% or higher **and** a mark of 50% or higher in the final examination. The final examination is a hurdle assessment and Students must obtain at least 50% in the final exam to be eligible to pass the unit. Students obtaining between 40% and 50% in the first attempt will be automatically given a second attempt to pass the hurdle requirement.

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.

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.

If you receive special consideration for the final exam, a supplementary exam will be scheduled in the interval between the regular exam period and the start of the next session. By making a special consideration application for the final exam you are declaring yourself available for a resit during the supplementary examination period and will not be eligible for a second special consideration approval based on pre-existing commitments. Please ensure you are familiar with the policy prior to submitting an application. You can check the supplementary exam information page on FSE101 in iLearn (bit.ly/FSESupp) for dates, and approved applicants will receive an individual notification one week prior to the exam with the exact date and time of their supplementary examination. If you are given a second opportunity to sit the final examination as a result of failing to meet the minimum mark required, you will be offered that chance during the same supplementary examination period and will be notified of the exact day and time after the publication of final results for the unit.