



ITEC803

Computer Networks

S1 Evening 2014

Computing

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General Information

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E6A360

By Appointment

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Credit points

4

Prerequisites

COMP347

Corequisites

Co-badged status

Unit description

This unit concerns itself with the design and implementation of real-world computer networks. We consider the various layers of modern network systems design, from the physical medium, through software protocol layers to the application protocols. Technical issues inherent to each layer are examined including routing, error detection and correction, flow control, connection management, data representation, and network security management.

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 protocols.

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

Review key issues related to network security and security protocol design.

Understand the design and analysis of real time multimedia networks.

Assessment Tasks

Name	Weighting	Due
Quiz 1	5%	Week 6
Assignment 1	20%	Week 7
Assignment 2	20%	Week 12
Quiz 2	5%	week 12
Final Exam	50%	TBA

Quiz 1

Due: **Week 6**

Weighting: **5%**

Quiz 1 is a short test (close book) that will be based on your previously covered lecture material for weeks 1-5. The quiz questions will be handed over to you at the beginning of your Lecture class. Quiz 1 contribute 5% of the total mark and serve as a feedback mechanism to monitor your progress in the unit.

On successful completion you will be able to:

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

Assignment 1

Due: **Week 7**

Weighting: **20%**

The assignment will cover various topics on network layer and protocols, including IP addressing (Subnetting, CIDR, Aggregation), Routing (General routing principles, RIP, OSP, BGP), Multicasting. This is an individual assignment and you must attempt it independently.

On successful completion you will be able to:

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

Assignment 2

Due: **Week 12**

Weighting: **20%**

The assignment 2 focusses on protocol design with security considerations.

On successful completion you will be able to:

- Review key issues related to network security and security protocol design.
- Understand the design and analysis of real time multimedia networks.

Quiz 2

Due: **week 12**

Weighting: **5%**

Quiz 2 is a short test (close book) that will be based on your previously covered lecture material for Weeks 6-11. The quiz questions will be handed over to you at the beginning of your Lecture class. Quiz 2 contribute 5% of the total mark and serve as a feedback mechanism to monitor your progress in the unit.

On successful completion you will be able to:

- Understand the key concepts, techniques and mechanisms in networking such as addressing, routing, multicast, label switching and TCP.
- Review key issues related to network security and security protocol design.
- Understand the design and analysis of real time multimedia networks.

Final Exam

Due: **TBA**

Weighting: **50%**

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

§ the University Examination period for First Half Year 2014 is from Monday 16th June to Friday 4th July 2014.

§ 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:

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- Analyse and Design network protocols.
- Understand the key concepts, techniques and mechanisms in networking such as addressing, routing, multicast, label switching and TCP.
- Review key issues related to network security and security protocol design.
- 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/Tutorials and other discussion are in E6A-131 in the lecture slot. There will also be some practical work (Cisco Labs) in E6A-265.

Lectures

Lectures are used to introduce computer network technologies, protocols 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.

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: 6 and 12. A quiz is a short test that will be based on your previously covered lecture material. For example, week 6 quiz will be based on lectures done in weeks 1-5. The quiz questions will be handed over to you at the beginning of your Lecture class. These quizzes contribute 10% 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 assignments are to be submitted in the assignment box labelled ITEC803 on the first floor of Building E6A. Late submission of the assignment will be accepted, but penalised at the rate of 10% per working 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 but these notes are intended as an outline of the lecture only and are not a substitute for your own notes or the textbook.

Required and 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.

Unit Schedule

Week Starting Date	Topic	Reading
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1 03/03/2014	Introduction TCP/IP, addressing	Comer - Chapters 21, 23/Comer (TCP/IP) Chapters 1, 5, 6
2 10/03/2014	Introduction to Routing Intra-domain Routing I (RIP)	Comer - Chapters 22, 27/Comer (TCP/IP)- Chapters 8, 14
3 17/03/2014	Intra-domain Routing 2 (OSPF) CIDR	Comer - Chapter 27/Comer (TCP/IP) Chapters 5, 8
4 24/03/2014	Interdomain Routing (BGP) Introduction to Multicasting	Comer - Chapter 27 (section 27.16)/Comer (TCP/IP) - Chapters 13, 15
5 31/03/2014	Multicast Routing Protocols	Comer - Chapter 27 (section 27.16)/Comer (TCP/IP)-Chapter 15
6 07/04/2014	Quiz 1 Network Security I	Comer - Chapter 30/Comer (TCP/IP)- Chapter 29
	No classes - Semester break	
7 28/04/2014	Network Security 2 Assignment 1 Submission	Comer - Chapters 30/Comer (TCP/IP) -Chapter 29
8 05/05/2014	Transport layer	Comer - Chapter 26/Comer (TCP/IP)- Chapter 11
9 12/05/2014	Physical/ Data Link/ Application layers	Comer - Chapters 6 to 11; Chapters 13, 14/Comer-Chapters 28, 29/Comer (TCP/IP) -Chapters 20, 23, 24, 25
10 19/05/2014	IP version 6	Comer - Chapter 24/Comer (TCP/IP) -Chapters 1, 5, 7, 22
11 26/05/2014	Quiz 2 Assignment 2 Submission Multimedia Networks	Comer - Chapter 29 /Comer (TCP/IP)- Chapter 26
12 02/06/2014	Advanced Topics: Multi-Protocol Label Switching (MPLS)	Comer - (TCP/IP) - Chapter 16
13 10/06/2014	Guest Lecture Revision and Exam Discussion	

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

Assessment Policy <http://mq.edu.au/policy/docs/assessment/policy.html>

Grading Policy <http://mq.edu.au/policy/docs/grading/policy.html>

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

Grievance Management Policy http://mq.edu.au/policy/docs/grievance_management/policy.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/

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://informatics.mq.edu.au/help/>.

When using the University's IT, you must adhere to the [Acceptable Use 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 protocols.
- Understand the key concepts, techniques and mechanisms in networking such as addressing, routing, multicast, label switching and TCP.
- Review key issues related to network security and security protocol design.
- Understand the design and analysis of real time multimedia networks.

Assessment tasks

- Quiz 1
- Assignment 1
- Assignment 2
- Quiz 2
- 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 protocols.
- Understand the key concepts, techniques and mechanisms in networking such as addressing, routing, multicast, label switching and TCP.
- Review key issues related to network security and security protocol design.
- Understand the design and analysis of real time multimedia networks.

Assessment tasks

- Assignment 1
- Assignment 2
- 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 protocols.
- Understand the key concepts, techniques and mechanisms in networking such as addressing, routing, multicast, label switching and TCP.
- Review key issues related to network security and security protocol design.
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Assessment tasks

- Quiz 1
- Assignment 1
- Assignment 2
- Quiz 2
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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.