ITEC852

Advanced System and Network Security

S2 Evening 2016

Dept of Computing

Contents

General Information

Unit convenor and teaching staff
Vijay Varadharajan
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By Appointment

Administration
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E6A 336

Credit points
4

Prerequisites
ITEC647

Corequisites

Co-badged status

Unit description
As organisations and users increasingly rely upon networked applications for assessing information and making critical business decisions, securing distributed applications is becoming extremely significant. The unit is concerned with the protection of information in computing systems and networks. It will address concepts and techniques for securing distributed applications.

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:

Analyse key security requirements and trends in a distributed networked computing environment

Develop and/or advance skills of research and critical analysis in a manner consistent with the completion of a postgraduate degree.

Evaluate authentication and access control security functionalities in distributed systems

and networks

Apply security techniques and mechanisms to develop security protocols

Analyse the security threats and develop security architecture and functionalities to counteract the security threats

General Assessment Information

Grade

	Learning Outcome 1	Learning Outcome 2	Learning Outcome 3	Learning Outcome 4	Learning Outcome 5
	Security Requirements	Security Threats, Functionalities and Architecture	Security Protocols	Security services for distributed systems and networks	Research and Critical Thinking and Communication Skills
HD	Demonstrates deep and critical understanding of key security requirements and shows substantial originality in their analysis and evaluation	A critical understanding of security threats and able to develop threat model. Able to design appropriate security functionalities and develop an overall security architecture	Demonstrates the ability to apply security techniques and mechanisms to identify flaws in security protocols. Demonstrate the ability to design secure protocols and carry out security analysis.	Demonstrates the ability to design security services for distributed systems and networks and carry out their security analysis.	Demonstrates significant originality and insight in critical evaluation of security solutions. Communicates effectively the analysis and the arguments
D	Demonstrates good understanding of the security requirements and shows some originality in their analysis	Demonstrates a clear understanding of threats and threat models. Demonstrates the ability to describe the design of security architecture and its functionalities	Demonstrates the ability to apply security techniques and mechanisms to identify security flaws in protocols and carry out security analysis.	Demonstrates a clear understanding of authentication and access control services in distributed systems and networks and the ability to analyse them	Demonstrates insights in solving security problems. Good presentation of ideas and arguments
Credit	Reasonable understanding of key security requirements and able to describe their characteristics	Shows substantial understanding of security threats. Able to understand the security functionalities in a security architecture	Demonstrates the ability to apply security techniques and mechanisms to describe security protocols and carry out some analysis.	Good understanding of authentication and access control functionalities in distributed systems and networks. Able to carry out basic evaluation of these security services	Provides evidence of a clear understanding of the security concepts and their applications. Clear communication of ideas.
Pass	Basic understanding	Recognizes the security threats in a system	Demonstrates the ability to apply	Basic understanding of authentication	Provides sufficient evidence

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.

Assessment Tasks

Name	Weighting	Due
Exam	60%	TBA
Group Project - (C&U, P, R)	30%	16 October 2016
Assignment	10%	18 Sept 2016

Exam

Due: **TBA**
Weighting: **60%**

Date to be confirmed by University in due course.

Note: Need to obtain at least 27 marks out of 60. That is, students need to obtain 45% in the exam component to pass the Unit.

On successful completion you will be able to:

- Analyse key security requirements and trends in a distributed networked computing environment
- Develop and/or advance skills of research and critical analysis in a manner consistent with the completion of a postgraduate degree.

- Evaluate authentication and access control security functionalities in distributed systems and networks
- Apply security techniques and mechanisms to develop security protocols
- Analyse the security threats and develop security architecture and functionalities to counteract the security threats

Group Project - (C&U, P, R)

Due: **16 October 2016**
Weighting: **30%**

Group Project Allocation: Week 7, 12 Sept 2016

Due: 16th Oct, 11.59pm (electronically) and 17th Oct in class (hard copy)

Project Topics allocated during Lectures. Project Allocated: Week 7 - 7th Sept 2015.

Presentations: 24th & 31st Oct 2016

(C&U) Content and Understanding: 10% (Individually assessed via Q&A on the Project)

(P) Presentation: 10% (Individually assessed)

(R) Project Report: 10% (Assessed as a Group)

On successful completion you will be able to:

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Assignment

Due: **18 Sept 2016**
Weighting: **10%**

Handed Out: Week 5, 29 Aug 2016

Due: Electronic Copy Via Email : by Sunday 18 Sept Midnight and Hardcopy Submission before 4 pm 19 Sept at E6A 336

Assignment on Security Mechanisms and Protocols

On successful completion you will be able to:

- Analyse key security requirements and trends in a distributed networked computing environment
- Apply security techniques and mechanisms to develop security protocols
- Analyse the security threats and develop security architecture and functionalities to counteract the security threats

Delivery and Resources

Technology

• Presentation using Powerpoint and other Computer Related Material

Lecture and Tutorial

• Provided in Unit Schedule

Unit Schedule

Information

• All unit information will be posted on iLearn (https://ilearn.mq.edu.au/login/MQ/). We assume that students will regularly check iLearn for information regarding lecture notes, practical material and other related resources.

• All emails related to ITEC852 should be sent to vijay.varadharajan@mq.edu.au and cc: donna.lukezic@mq.edu.au (Donna Lukezic, Executive Assistant to Prof. Vijay Varadharajan) and must include your full name and your student id number.

Other Material

References

• William Stallings, Cryptography and Network Security: Principles and Practices, Prentice Hall (4th Edition) · Charles Pfleeger, Security in Computing, Prentice Hall, 20026 (4th Edition)

• Charlie Kaufman, Radia Perlman and Mike Speciner, Network Security: Private Communication in a Public World, Prentice Hall

• Dieter Gollman, Computer Security, John Wiley

• Simson Garfinkel and Gene Spafford, Practical Unix Security, O'Reilly & Associates, Inc.

• Trusted Computing Platforms: TCPA Technology in Context, Ed: Siani Pearson, Prentice Hall, 2003

• Ross Anderson, Security Engineering, John Wiley, 1st or 2nd Edition

Tentative Lecture Schedule ITEC 852 S2 2016 (may vary depending upon progress)

1 Aug: Lecture 1: Introduction: Cyber Security Trends and Concepts

8 Aug: Lecture 2: Threat Modelling

15 Aug: Lecture 3: Security Architecture

22 Aug: Lecture 4: Cryptography and Key Management

29 Aug: Lecture 5: Security Protocols Assignment Handed Out

5 Sept : Lecture 6: Access Control Models

12 Sept: Lecture 7: Operating Systems Security, Secure Virtualization Group Project Allocation

18 Sept (Midnight): ASSIGNMENT SUBMISSION

SEMESTER BREAK

03 Oct : Public Holiday

10 Oct : Lecture 8: Distributed Systems Security, Cloud Computing Security Assignment Solution Session

16 Oct Midnight: PROJECT REPORT SUBMISSION

17 Oct: Lecture 9: Network Security (IP Security, Mobile IP Security and Wireless Security)

24 Oct: Lecture 10: Trusted Computing/ Group Project Presentations (1)

31 Oct: Lecture 11: Group Project Presentation (2)

7 Nov: Lecture 12: Revision

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 - Capable of Professional and Personal Judgment and Initiative

Our postgraduates will demonstrate a high standard of discernment and common sense in their

professional and personal judgment. They will have the ability to make informed choices and decisions that reflect both the nature of their professional work and their personal perspectives.

This graduate capability is supported by:

Learning outcomes

- Develop and/or advance skills of research and critical analysis in a manner consistent with the completion of a postgraduate degree.
- Evaluate authentication and access control security functionalities in distributed systems and networks
- Apply security techniques and mechanisms to develop security protocols
- Analyse the security threats and develop security architecture and functionalities to counteract the security threats

Assessment tasks

- Exam
- Group Project - (C&U, P, R)

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

- Analyse key security requirements and trends in a distributed networked computing environment
- Develop and/or advance skills of research and critical analysis in a manner consistent with the completion of a postgraduate degree.
- Evaluate authentication and access control security functionalities in distributed systems and networks
- Apply security techniques and mechanisms to develop security protocols
- Analyse the security threats and develop security architecture and functionalities to counteract the security threats

Assessment tasks

- Exam
- Group Project - (C&U, P, R)
- Assignment

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

- Analyse key security requirements and trends in a distributed networked computing environment
- Develop and/or advance skills of research and critical analysis in a manner consistent with the completion of a postgraduate degree.
- Evaluate authentication and access control security functionalities in distributed systems and networks
- Apply security techniques and mechanisms to develop security protocols
- Analyse the security threats and develop security architecture and functionalities to counteract the security threats

Assessment tasks

- Exam
- Group Project - (C&U, P, R)
- Assignment

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

- Analyse key security requirements and trends in a distributed networked computing environment
- Develop and/or advance skills of research and critical analysis in a manner consistent with the completion of a postgraduate degree.
- Evaluate authentication and access control security functionalities in distributed systems and networks

- Apply security techniques and mechanisms to develop security protocols
- Analyse the security threats and develop security architecture and functionalities to counteract the security threats

Assessment tasks

- Exam
- Group Project - (C&U, P, R)

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:

Learning outcomes

- Develop and/or advance skills of research and critical analysis in a manner consistent with the completion of a postgraduate degree.
- Apply security techniques and mechanisms to develop security protocols
- Analyse the security threats and develop security architecture and functionalities to counteract the security threats

Assessment task

- Group Project - (C&U, P, R)

PG - Engaged and Responsible, Active and Ethical Citizens

Our postgraduates will be ethically aware and capable of confident transformative action in relation to their professional responsibilities and the wider community. They will have a sense of connectedness with others and country and have a sense of mutual obligation. They will be able to appreciate the impact of their professional roles for social justice and inclusion related to national and global issues

This graduate capability is supported by:

Learning outcomes

- Analyse key security requirements and trends in a distributed networked computing environment
- Analyse the security threats and develop security architecture and functionalities to counteract the security threats

Assessment tasks

- Exam
- Group Project - (C&U, P, R)