



**MONASH** University  
Information Technology

**FIT5037**  
**Advanced network security**

**Unit Guide**

**Semester 2, 2012**

The information contained in this unit guide is correct at time of publication. The University has the right to change any of the elements contained in this document at any time.

*Last updated: 23 Jul 2012*

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# **FIT5037 Advanced network security - Semester 2, 2012**

This unit aims to provide students with an advanced knowledge of network security. Topics to be covered include the design and implementation of some important public key systems: RSA and Elliptic Curve algorithms; concepts of quantum cryptography; quantum computing and cryptography; wireless computing and cryptography; design, implementation and configuration of firewalls in depth; design, implementation and configuration of intrusion detection systems; prevention systems; advanced network security architectures; advanced wireless security: principle and practice; security in trusted-based computing environments; and quantum cryptography.

## **Mode of Delivery**

Caulfield (Day)

## **Contact Hours**

2 hrs lectures/wk, 2 hrs laboratories/wk

## **Workload**

Workload commitments per week are:

Two-hour lecture, two-hour tutorial (or laboratory) requiring preparation in advance, and a minimum of two-hours of personal study per one-hour of contact time in order to satisfy the reading and assignment expectations.

## **Unit Relationships**

### **Prohibitions**

CPE5021

### **Prerequisites**

FIT5044

### **Chief Examiner**

Dr Phu Le

### **Campus Lecturer**

### **Caulfield**

**Phu Dung Le**

Consultation hours: Wednesday 8pm - 10pm

# Academic Overview

## Outcomes

At the completion of this unit students will:

- understand the design and implementation of advanced cryptographic algorithms for wired and wireless computing environments including the design and implementation of RSA and ECC;
- achieve sound knowledge of network security components including the design, implementation, and configuration of Firewalls, Intrusion Detection Systems (static and dynamic checking of programs, anomaly detection, large-scale (Internet-wide) distributed intrusion detection, early sensing, complex attack scenario analysis, and automated response), Prevention Systems, Firewalls, IDSs, VPNs and prevention systems together;
- develop knowledge of advanced network security architectures to allow better network protection, load balancing and recovery from attacks;
- achieve sound knowledge of wireless network security;
- understand security in trusted-based computing environments;
- understand Quantum cryptography.

## Graduate Attributes

Monash prepares its graduates to be:

1. responsible and effective global citizens who:

- a. engage in an internationalised world
- b. exhibit cross-cultural competence
- c. demonstrate ethical values

critical and creative scholars who:

- a. produce innovative solutions to problems
- b. apply research skills to a range of challenges
- c. communicate perceptively and effectively

## Assessment Summary

Assignments: 40%; Lab exercises and group assignments: 30%; Theoretical test: 30%

<b>Assessment Task</b>	<b>Value</b>	<b>Due Date</b>
Group Assignment	20%	Week 8, Friday 4pm
Individual Assignment	40%	Week 14, Friday 4pm
Lab Exercises	10%	Weekly (Week 2 to Week 10)
Theoretical test	30%	Week 12 lecture

## Teaching Approach

### Lecture and tutorials or problem classes

This teaching and learning approach provides facilitated learning, practical exploration and peer learning.

## Feedback

### Our feedback to You

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

- Informal feedback on progress in labs/tutes

### 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 SETU, Student Evaluation of Teacher and Unit. 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, and on student evaluations, see:

<http://www.monash.edu.au/about/monash-directions/directions.html>

<http://www.policy.monash.edu/policy-bank/academic/education/quality/student-evaluation-policy.html>

## Previous Student Evaluations of this unit

Feedback from past students clearly has highlighted the following strengths and necessary improvements:

1. The unit has advanced students in the area of network security and it was a plus to their degree.
2. Assignments tasks were too difficult for some students, especially the implementations of RSA and ECC.
3. Assignments tasks required too much of reading and research.

If you wish to view how previous students rated this unit, please go to

<https://emuapps.monash.edu.au/unitevaluations/index.jsp>

## Required Resources

Please check with your lecturer before purchasing any Required Resources. Limited copies of prescribed texts are available for you to borrow in the library, and prescribed software is available in student labs.

Removable hard drives and Scientific Linux software will be provided at the labs.

## Unit Schedule

Week	Activities	Assessment
0		No formal assessment or activities are undertaken in week 0
1	Modern computing and network security	
2	Modern Crypto Systems	Weekly Lab Exercises (Week 2 to Week 10) commence
3	ECC design and implementation	
4	Introduction to intrusion detection systems	
5	Security of wireless networks and applications	
6	Advanced wireless network security	
7	Networked and distributed software security	
8	Networked and distributed software security (continued)	Group Assignment due Week 8, Friday 4pm
9	Computer system security and performance	
10	Security of large computer systems including virtual networks and cloud computing systems	
11	Advanced theories and network security approaches (if there is still time)	
12	Theoretical test in lecture	Theoretical test in lecture Week 12
	SWOT VAC	No formal assessment is undertaken in SWOT VAC; Individual Assignment due Week 14, Friday 4pm
	Examination period	LINK to Assessment Policy: <a href="http://policy.monash.edu.au/policy-bank/academic/education/assessment/assessment-in-coursework-policy.html">http://policy.monash.edu.au/policy-bank/academic/education/assessment/assessment-in-coursework-policy.html</a>

\*Unit Schedule details will be maintained and communicated to you via your MUSO (Blackboard or Moodle) learning system.

# Assessment Requirements

## Assessment Policy

Faculty Policy - Unit Assessment Hurdles

(<http://www.infotech.monash.edu.au/resources/staff/edgov/policies/assessment-examinations/unit-assessment-hu>)

Academic Integrity - Please see the Demystifying Citing and Referencing tutorial at

<http://lib.monash.edu/tutorials/citing/>

## Assessment Tasks

### Participation

- **Assessment task 1**

**Title:**

Group Assignment

**Description:**

Choose one of the two options:

Option 1 - You are required to design and implement the ECC and Lattice Based public key systems using C or C++ or Java.

Option 2 - You are required to set up a complete penetration testing of your wireless network using open source tools to test your own wireless network.

For the group assignment, students will receive equal marks, however every member of the group will be interviewed. Marks may be individually adjusted under special circumstances.

More details will be provided on the assignment specification.

**Weighting:**

20%

**Criteria for assessment:**

Option 1 - You have to demonstrate your understanding of the algorithms used in your implementation. A good security analysis of your implementation will give you 30% of the total mark. If your code works and reflects the theory of ECC, this will give you another 30%. Your correct demonstration and answers to interview questions will give you the final 40% of the mark.

Option 2 - Your complete security configuration will get you 40% of the total mark. Good security tests of all your security services and a report with your test plans, limitations and possible attacks beyond your defence system will be worth 60% of the total mark.

**Due date:**

Week 8, Friday 4pm

• **Assessment task 2**

**Title:**

Individual Assignment

**Description:**

You will work on one of the two projects:

Project 1 - You are required to set up, configure and test your complete defence system using using virtual machines.

Project 2 - You are required to set up a cloud environment and do a complete test of its security.

More details will be provided on the assignment specification.

**Weighting:**

40%

**Criteria for assessment:**

If you install and configure all the required system security services correctly you will be given 20% of the total mark. Providing correctly written test plans will give you another 40%. Your demonstration of your tests and answers to interview questions will be worth 40% of the total mark.

**Due date:**

Week 14, Friday 4pm

• **Assessment task 3**

**Title:**

Lab Exercises

**Description:**

Lab exercises will be handed out each week from Week 2 to Week 10. Please read the handouts for details.

**Weighting:**

10%

**Criteria for assessment:**

You will get the full mark if you can complete the exercise and demonstrate it. Different marks will be given depending on the level of completion and demonstration.

**Due date:**

Weekly (Week 2 to Week 10)

• **Assessment task 4**

**Title:**

Theoretical test

**Description:**

The theoretical test will evaluate your understanding of the theories covered in the unit. It is an open book test and 80% are multiple choice questions and 20% are short answer questions. You will have to study all the materials delivered in the lectures and tutorials/labs.

**Weighting:**

30%

**Criteria for assessment:**

Correct answers to questions, demonstrating understanding of the materials learned.

**Due date:**

Week 12 lecture



## **Assignment submission**

It is a University requirement

(<http://www.policy.monash.edu/policy-bank/academic/education/conduct/plagiarism-procedures.html>) 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).

## **Online submission**

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

## **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.infotech.monash.edu.au/resources/student/equity/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.

## 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:

<http://policy.monash.edu.au/policy-bank/academic/education/index.html>

Key educational policies include:

- Plagiarism  
(<http://www.policy.monash.edu/policy-bank/academic/education/conduct/plagiarism-policy.html>)
- Assessment  
(<http://www.policy.monash.edu/policy-bank/academic/education/assessment/assessment-in-coursework-p>)
- Special Consideration  
(<http://www.policy.monash.edu/policy-bank/academic/education/assessment/special-consideration-policy.h>)
- 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/key-dates/>);
- Orientation and Transition (<http://www.infotech.monash.edu.au/resources/student/orientation/>);  
and
- Academic and Administrative Complaints and Grievances Policy  
(<http://www.policy.monash.edu/policy-bank/academic/education/management/complaints-grievance-policy>)
- Codes of Practice for Teaching and Learning  
(<http://www.policy.monash.edu.au/policy-bank/academic/education/conduct/suppdocs/code-of-practice-tea>)

### 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 [www.monash.edu.au/students](http://www.monash.edu.au/students). For Sunway see <http://www.monash.edu.my/Student-services>, and for South Africa see <http://www.monash.ac.za/current/>

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

Academic support services may be available for students who have a disability or medical condition. Registration with the Disability Liaison Unit is required. Further information is available as follows:

- Website: <http://monash.edu/equity-diversity/disability/index.html>;
- Email: [dlu@monash.edu](mailto:dlu@monash.edu)
- Drop In: Equity and Diversity Centre, Level 1 Gallery Building (Building 55), Monash University, Clayton Campus, or Student Community Services Department, Level 2, Building 2, Monash University, Sunway Campus
- Telephone: 03 9905 5704, or contact the Student Advisor, Student Community Services at 03 55146018 at Sunway