Faculty of Engineering & Built Environment

School of Electrical Engineering and Computing

SENG2250: System and Network Security

Callaghan

Semester 2 - 2020

THE UNIVERSITY OF NEWCASTLE AUSTRALIA

COURSE OUTLINE

OVERVIEW

Course 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. This course is concerned with the protection of information in computing systems and networks. It addresses concepts and techniques for securing distributed applications.

Assumed Knowledge

1. A basic understanding of the structure and function of operating systems
2. A basic understanding of computer networks and network protocols.
3. Discrete math (number theory)
4. Programming skills (Java or Python or C++)

Contact Hours

Callaghan
Laboratory
Face to Face on Campus
2 hour(s) per Week for Full Term

Lecture
Face to Face on Campus
2 hour(s) per Week for Full Term

Unit Weighting
Workload

10
Students are required to spend on average 120-140 hours of effort (contact and non-contact) including assessments per 10-unit course.

CONTACTS

Course Coordinator

Callaghan
Dr Nan Li
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02 49 216503
Consultation: TBA

Teaching Staff

Other teaching staff will be advised on the course Blackboard site.

School Office

School of Electrical Engineering and Computing
ICT307
ICT Building
Callaghan
+61 2 4921 6026
8.30am-4.30pm (Monday to Friday) AEST

SYLLABUS

Course Content

1. Course overview
2. Cryptographic techniques
3. Key management and distribution
4. User authentication
5. Access control
6. Operating system security
7. Distributed system security
8. Network security
9. Application security

Course Learning Outcomes

On successful completion of this course, students will be able to:

1. Identify key security requirements and trends in a distributed networked computing environment.

2. Describe security threats and apply security functionalities to counteract security threats.

3. Apply security techniques and mechanisms to develop secure systems and protocols.

4. Utilise analytical skills to evaluate security protocols and mechanisms.

5. Evaluate authentication and access control security functionalities in distributed systems and networks.

Course Materials

Recommended Reading:

- William Stallings. Network Security Essentials: Applications and Standards. Prentice Hall, 6th edition, 2016.

- C.P. Pfleeger and S.L. Pfleeger. Security in Computing. Prentice Hall, 4th(&5th) editions, 2007 (2015).

COMPULSORY REQUIREMENTS

In order to pass this course, each student must complete ALL of the following compulsory requirements:

Contact Hour Requirements:

Course Assessment Requirements:

- Assessment 4 - Formal Examination: Minimum Grade / Mark Requirement - Students must obtain a specified minimum grade / mark in this assessment item to pass the course. Students whose overall mark in the course is 50% or more, but who score less than 40% in the compulsory item and thus fail to demonstrate the required proficiency, will be awarded a Criterion Fail grade, which will show as FF on their formal transcript. However, students in this position who have scored at least 25% in the compulsory item will be allowed to undertake a supplementary 'capped' assessment in which they can score at most 50% of the possible mark for that item.

Pre-Placement Requirements:

ASSESSMENTS

This course has 4 assessments. Each assessment is described in more detail in the sections below.

	Assessment Name	Due Date	Involvement	Weighting	Learning Outcomes
1	Assignment 1 - Security Fundamentals	Week 4	Individual	10%	1, 2
2	Assignment 2 - Authentication and System Security	Week 8	Individual	15%	1, 3
3	Assignment 3 - Network Security and Secure Coding	Week 12	Individual	25%	1, 4, 5
4	Formal Examination*	EXAM PERIOD	Individual	50%	1, 2, 3, 4, 5

* This assessment has a compulsory requirement.

Late Submissions The mark for an assessment item submitted after the designated time on the due date, without an approved extension of time, will be reduced by 10% of the possible maximum mark for that assessment item for each day or part day that the assessment item is late. Note: this applies equally to week and weekend days.

Assessment 1 - Assignment 1 - Security Fundamentals

Assessment Type Written Assignment
Description Writing assignments meet the course objectives of knowledge acquisition and demonstrated assimilation of data, upon reflection and analysis, to produce articulate and concise documents and solutions which convey evidence-based understanding of the concepts and topics.
Weighting 10%
Due Date Week 4
Submission Method Online
Assessment Criteria Correctness of solutions to the questions and clarity of justification.
Return Method Not Returned
Feedback Provided Online

Assessment 2 - Assignment 2 - Authentication and System Security

Assessment Type	Written Assignment
Description	Writing assignments meet the course objectives of knowledge acquisition and demonstrated assimilation of data, upon reflection and analysis, to produce articulate and concise documents and solutions which convey evidence-based understanding of the concepts and topics.
Weighting	15%
Due Date	Week 8
Submission Method	Online
Assessment Criteria	Correctness of solutions to the questions and clarity of justification.
Return Method	Not Returned
Feedback Provided	Online

Assessment 3 - Assignment 3 - Network Security and Secure Coding

Assessment Type	Written Assignment
Description	Writing and programming assignments meet the course objectives of knowledge acquisition and demonstrated assimilation of data, upon reflection and analysis, to produce articulate and concise documents and artefacts which convey evidence-based understanding of the concepts and topics.
Weighting	25%
Due Date	Week 12
Submission Method	Online
Assessment Criteria	Correctness of solutions to the questions, program code, clarity of justification and written report.
Return Method	Not Returned
Feedback Provided	Online

Assessment 4 - Formal Examination

Assessment Type	Formal Examination
Description	Exams are designed to test students' knowledge and understanding of the course material and their ability to analyse that material. The Final Examination is a Compulsory Course Component.
Weighting	50%
Compulsory Requirements	Minimum Grade / Mark Requirement - Students must obtain a specified minimum grade / mark in this assessment item to pass the course.
Due Date	EXAM PERIOD
Submission Method	Formal Exam
Assessment Criteria	Clarity and correctness of written answers.
Return Method	Not Returned
Feedback Provided	No Feedback
Opportunity to Reattempt	Students WILL be given the opportunity to reattempt this assessment. Refer to course outline for details.

ADDITIONAL INFORMATION

Grading Scheme

This course is graded as follows:

Range of Marks	Grade	Description
85-100	High Distinction (HD)	Outstanding standard indicating comprehensive knowledge and understanding of the relevant materials; demonstration of an outstanding level of academic achievement; mastery of skills*; and achievement of all assessment objectives.
75-84	Distinction (D)	Excellent standard indicating a very high level of knowledge and understanding of the relevant materials; demonstration of a very high level of academic ability; sound development of skills*; and achievement of all assessment objectives.
65-74	Credit	Good standard indicating a high level of knowledge and

	(C)	understanding of the relevant materials; demonstration of a high level of academic achievement; reasonable development of skills*; and achievement of all learning outcomes.
50-64	Pass (P)	Satisfactory standard indicating an adequate knowledge and understanding of the relevant materials; demonstration of an adequate level of academic achievement; satisfactory development of skills*; and achievement of all learning outcomes.
0-49	Fail (FF)	Failure to satisfactorily achieve learning outcomes. If all compulsory course components are not completed the mark will be zero. A fail grade may also be awarded following disciplinary action.

*Skills are those identified for the purposes of assessment task(s).

Communication Methods

Communication methods used in this course include:

Course Evaluation

Each year feedback is sought from students and other stakeholders about the courses offered in the University for the purposes of identifying areas of excellence and potential improvement.

Academic Misconduct

All students are required to meet the academic integrity standards of the University. These standards reinforce the importance of integrity and honesty in an academic environment. Academic Integrity policies apply to all students of the University in all modes of study and in all locations. For the Student Academic Integrity Policy, refer to https://policies.newcastle.edu.au/document/view-current.php?id=35.

Adverse Circumstances

You are entitled to apply for special consideration because adverse circumstances have had an impact on your performance in an assessment item. This includes applying for an extension of time to complete an assessment item. Prior to applying you must refer to the Adverse Circumstances Affecting Assessment Items Procedure, available at https://policies.newcastle.edu.au/document/view-current.php?id=236. All applications for Adverse Circumstances must be lodged via the online Adverse Circumstances system, along with supporting documentation.

Important Policy Information

The 'HELP for Students' tab in UoNline contains important information that all students should be familiar with, including various systems, policies and procedures.

This course builds students' capacity in the following University of Newcastle Bachelor of Engineering Graduate Profile Statements:

	University of Newcastle Bachelor of Engineering Graduate Profile Statements	Taught	Practised	Assessed	Level of capability
	Knowledge Base				
1	1.1. Comprehensive, theory-based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline.				
2	1.2. Conceptual understanding of the, mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline.	☑	☑	☑	2
3	1.3. In-depth understanding of specialist bodies of knowledge within the engineering discipline.				
4	1.4. Discernment of knowledge development and research directions within the engineering discipline.	☑	☑	☑	2
5	1.5. Knowledge of contextual factors impacting the engineering discipline.				
6	1.6. Understanding of the scope, principles, norms, accountabilities and bounds of contemporary engineering practice in the specific discipline.				
	Engineering Ability				
7	2.1. Application of established engineering methods to complex engineering problem solving.				
8	2.2. Fluent application of engineering techniques, tools and resources.	☑	☑	☑	2
9	2.3. Application of systematic engineering synthesis and design processes.				
10	2.4. Application of systematic approaches to the conduct and management of engineering projects.				
	Professional Attributes				
11	3.1. Ethical conduct and professional accountability				
12	3.2. Effective oral and written communication in professional and lay domains.	☑	☑	☑	2
13	3.3. Creative, innovative and pro-active demeanour.				
14	3.4. Professional use and management of information.				
15	3.5. Orderly management of self, and professional conduct.				
16	3.6. Effective team membership and team leadership.				

This course builds students' capacity in the following University of Newcastle Bachelor of Computer Science Graduate Profile Statements:

	University of Newcastle Computer Science Graduate Profile Statements	Taught	Practised	Assessed	Level of Capability
1	Knowledge of basic science and computer science fundamentals.				
2	In depth technical competence in the discipline of computer science	☑	☑	☑	2
3	An ability to carry out problem analysis, requirements capture, problem formulation and integrated software development for the solution of a problem.				
4	Capacity to continue developing relevant knowledge, skills and expertise in computer science throughout their careers.				
5	An ability to communicate effectively with other Computer Scientists, Software Engineers, other professional disciplines, managers and the community generally.	☑	☑	☑	2
6	Ability to undertake and co-ordinate large computer science projects and to identify problems, their formulation and solution.				
7	Ability to function effectively as an individual, a team member in multidisciplinary and multicultural teams and as leader/manager with capacity to assist and encourage those under their direction.				
8	Understanding of social, cultural, global and business opportunities of the professional computer scientist; understanding the need for and principles of sustainability and adaptability				
9	Understanding of professional and ethical responsibilities and a commitment to them.				
10	Understanding of entrepreneurship; need of and process of innovation, as well as the need of and capacity for lifelong learning.				

This course outline was approved by the Head of School. No alteration of this course outline is permitted without Head of School approval. If a change is approved, students will be notified, and an amended course outline will be provided in the same manner as the original.