

# TELE3119

Trusted Networks

Term 3, 2021



## Course Overview

### Staff Contact Details

#### Convenors

Name	Email	Availability	Location	Phone
Aruna Seneviratne	<a href="mailto:a.seneviratne@unsw.edu.au">a.seneviratne@unsw.edu.au</a>	Wednesday 1500-1700	ELEC ENG 315	x55389

#### Demonstrators

Name	Email	Availability	Location	Phone
Junye Li	<a href="mailto:junye.li@unsw.edu.au">junye.li@unsw.edu.au</a>			

### School Contact Information

**Consultations:** Lecturer consultation times will be advised during the first lecture. You are welcome to email the tutor or laboratory demonstrator, who can answer your questions on this course and can also provide you with consultation times. ALL email enquiries should be made from your student email address with ELEC/TELExxxx in the subject line; otherwise they will not be answered.

**Keeping Informed:** Announcements may be made during classes, via email (to your student email address) and/or via online learning and teaching platforms – in this course, we will use Moodle <https://moodle.telt.unsw.edu.au/login/index.php>. Please note that you will be deemed to have received this information, so you should take careful note of all announcements.

### Student Support Enquiries

[For enrolment and progression enquiries please contact Student Services](#)

### Web

[Electrical Engineering Homepage](#)

[Engineering Student Support Services](#)

[Engineering Industrial Training](#)

[UNSW Study Abroad and Exchange](#) (for inbound students)

## [UNSW Future Students](#)

### **Phone**

(+61 2) 9385 8500 – Nucleus Student Hub

(+61 2) 9385 7661 – Engineering Industrial Training

(+61 2) 9385 3179 – UNSW Study Abroad and UNSW Exchange (for inbound students)

### **Email**

[Engineering Student Support Services](#) – current student enquiries

- e.g. enrolment, progression, clash requests, course issues or program-related queries

[Engineering Industrial Training](#) – Industrial training questions

[UNSW Study Abroad](#) – study abroad student enquiries (for inbound students)

[UNSW Exchange](#) – student exchange enquiries (for inbound students)

[UNSW Future Students](#) – potential student enquiries

- e.g. admissions, fees, programs, credit transfer

## Course Details

### Units of Credit 6

### Summary of the Course

This course will provide an understanding of the security issues in communication networks. This course is designed to provide an integrated focus for security-related aspects of networking, as a core competency for telecommunications engineers. More specifically, the course is intrinsically linked to the concepts, protocols, and networking fundamentals developed in TELE3118 and TELE4642. The networking issues covered in TELE3118/TELE4642 are re-analysed from the standpoint of trust, authentication, integrity and security. Understanding the principles underlying trust and security in modern telecommunication networks is considered a paramount networking skill. As such, this course is core for all Telecommunication students.

The course consists of lectures, tutorials and Laboratory sessions every week (starting from week 2) as shown in the table below.

	Day	Time	Location
<b>Lectures</b>	Monday	1000 - 1200	ELEC ENGG22/Online
	Wednesday	0900 - 1100	CLB 3
<b>Lab</b>	Wednesday	1200-1500	Online
	Thursday	1500-1800	ElecEng206/Online
<b>Tutorial</b>	Monday (w1-8; 10-11)	1300-1400	ElecEng206/Online
	Monday (w1-8; 10-11)	1400-1500	Online

### Course Aims

This course is for 6 Units of Credit and is aimed at Undergraduate Engineers wishing to understand security issues in communication networks. This course is designed to provide an integrated focus for security-related aspects of networking, as a core competency for telecommunications engineers. More specifically, the course is intrinsically linked to the concepts, protocols, and networking fundamentals developed in Tele3118 and TELE4642. The networking issues covered in Tele3118/Tele4642 are re-analysed from the standpoint of trust, authentication, integrity and security. Understanding the principles underlying trust and security in modern telecommunication networks is considered a paramount networking skill. As such, this course is core for all Telecommunication students.

### Course Learning Outcomes

After successfully completing this course, you should be able to:

Learning Outcome	EA Stage 1 Competencies
1. Understand and explain the theory, concepts and challenges of encryption protocols	PE1.1, PE1.2, PE1.4, PE1.5, PE1.6, PE2.1, PE2.2, PE2.4, PE3.2, PE3.3, PE3.4, PE3.5, PE3.6
2. Understand and explain the theory, concepts and challenges of authentication protocols	PE1.1, PE1.2, PE1.3, PE1.4, PE1.5, PE1.6, PE2.1, PE2.2, PE2.3, PE2.4, PE3.2, PE3.3, PE3.4, PE3.5, PE3.6
3. Understand and explain how applications actually operate over communication networks	PE1.1, PE1.2, PE1.3, PE1.4, PE1.5, PE1.6, PE2.1, PE2.2, PE2.3, PE2.4, PE3.2, PE3.3, PE3.4, PE3.5, PE3.6
4. Understand and explain key objectives in designing and analyzing a secured network	PE1.1, PE1.2, PE1.3, PE1.4, PE1.5, PE1.6, PE2.1, PE2.2, PE2.3, PE2.4, PE3.2, PE3.3, PE3.4, PE3.5, PE3.6
5. Design and simulate the behavior of security in communication networks	PE1.1, PE1.2, PE1.3, PE1.4, PE1.5, PE1.6, PE2.1, PE2.2, PE2.3, PE2.4, PE3.2, PE3.3, PE3.4, PE3.5, PE3.6
6. Design secure and trusted network applications, and design web-based applications running over Secure Sockets Layer	PE1.1, PE1.2, PE1.3, PE1.4, PE1.5, PE1.6, PE2.1, PE2.2, PE2.3, PE2.4, PE3.2, PE3.3, PE3.4, PE3.5, PE3.6
7. Design network authentication systems and possess the ability to analyze network traffic from a security standpoint	PE1.1, PE1.2, PE1.4, PE1.5, PE1.6, PE2.1, PE2.2, PE2.3, PE2.4, PE3.2, PE3.3, PE3.4, PE3.5, PE3.6

## Teaching Strategies

### *Delivery Mode*

The teaching in this course aims at establishing a good fundamental understanding of the areas covered using:

- Lectures – to give the basic material, discuss the intuition behind the mathematics, and learn to incorporate rigour in the solution process.
- Tutorials – to learn problem-solving techniques, employ critical thinking, and reflect and discuss alternative techniques.
- Labs – laboratory assignments will provide hands-on experience of network security and an opportunity for constructing and evaluating practical tools.
- Project – will use group work as a means of exploring a research problem in greater depth, and provide you with the opportunity to demonstrate and communicate your approach and solution.

- Quizzes – will provide feedback on your progress in problem-solving.
- Final examination – final test of competency.

### ***Learning in this course***

You are expected to attend all lectures, labs, and quizzes to maximise learning. You must prepare well for your laboratory classes and your lab work will be assessed. In addition to the lecture notes, you should read relevant sections of the recommended text. Reading additional texts will further enhance your learning experience. Group learning is also encouraged. UNSW *assumes* that self-directed study of this kind is undertaken in addition to attending face-to-face classes throughout the course.

## Assessment

Assessment task	Weight	Due Date	Course Learning Outcomes Assessed
1. Final Examination	40%	Not Applicable	1, 2, 3, 4, 5, 6, 7
2. Class Quizzes	30%	Not Applicable	1, 2, 3, 4, 5
3. Laboratory Assessment	30%	Not Applicable	1, 2, 3, 4, 5, 6, 7

### Assessment 1: Final Examination

This covers the material from week 1- 10.

### Assessment 2: Class Quizzes

Class Quiz 1 - Covers material from week 1-3

Class Quiz 2 - Covers material from week 4-8

### Assessment 3: Laboratory Assessment

These labs will be conducted in a virtual laboratory environment. This will involve you setting up the environment and carrying out 4 laboratory exercises. The above tasks will be of different durations and will have different weights. The overall weight for the laboratory component is 30%

## Attendance Requirements

Students are strongly encouraged to attend all classes and review lecture recordings.

## Course Schedule

<b>Period</b>	<b>Summary of Lecture Program</b>
Week 1	Overview & Basics of Cryptography 1  (Symmetric Encryption: Product and Block Ciphers)
Week 2	Basics of Cryptography 2  (Asymmetric Encryption: Diffie Hellman Key Exchange, RSA)
Week 3	Cryptography Infrastructure  Message Authentication Codes, Public Key Infrastructure, PGP and Signal Protocol
Week 4	<b>Class Quiz 1 &amp; Applications 1:</b>  Crypto Currencies
Week 5	Applications 2:  Internet Privacy TOR
Week 6	<i>Flexibility Week</i>
Week 7	Securing Communications 1  TLS/SSL, IPsec
Week 8	Securing Communications 2:  Wireless Local Area Networks (WEP/WPA)
Week 9	<b>Class Quiz 2</b> and Securing Networked Systems  Firewall, Intrusion Detection Systems, VPNs
Week 10	Attacking Networked Systems  Data Exfiltration & Side Channel Attacks



## **Resources**

### **Prescribed Resources**

The class will not follow one textbook but will consist of material taken from various sources, including textbooks, online material, and other literature.

Additional reference material and papers will be detailed in class.

### **Course Evaluation and Development**

This course is under constant revision to improve the learning outcomes for all students. Based on feedback from past years we will endeavour to provide more support for programming aspects of the lab work. Please forward any feedback (positive or negative) on the course to the course convener or via the online student survey MyExperience. As a result of previous feedback obtained for this course and in our efforts to provide a rich and meaningful learning experience, we have continued to evaluate and modify our delivery and assessment methods.

### **Laboratory Workshop Information**

The laboratory schedule is deliberately designed to provide practical, hands-on exposure to the concepts conveyed in lectures. Instructions on how the laboratories will be set up will be provided in week 1. Then a series of laboratory exercises that needs to be completed will be released from week 2 onwards. You are required to attend laboratory sessions get these exercise marked off by the lab demonstrator.

## **Academic Honesty and Plagiarism**

### **Academic Honesty and Plagiarism**

Plagiarism is the unacknowledged use of other people's work, including the copying of assignment works and laboratory results from other students. Plagiarism is considered a form of academic misconduct, and the University has very strict rules that include some severe penalties. For UNSW policies, penalties and information to help you avoid plagiarism, see <https://student.unsw.edu.au/plagiarism>. To find out if you understand plagiarism correctly, try this short quiz: <https://student.unsw.edu.au/plagiarism-quiz>.

### **General Conduct and Behaviour**

Consideration and respect for the needs of your fellow students and teaching staff is an expectation. Conduct which unduly disrupts or interferes with a class is not acceptable and students may be asked to leave the class.

## Academic Information

### COVID19 - Important Health Related Notice

Your health and the health of those in your class is critically important. You must stay at home if you are sick or have been advised to self-isolate by [NSW health](#) or government authorities. Current alerts and a list of hotspots can be found [here](#). **You will not be penalised for missing a face-to-face activity due to illness or a requirement to self-isolate.** We will work with you to ensure continuity of learning during your isolation and have plans in place for you to catch up on any content or learning activities you may miss. Where this might not be possible, an application for fee remission may be discussed.

If you are required to self-isolate and/or need emotional or financial support, please contact the [Nucleus: Student Hub](#). If you are unable to complete an assessment, or attend a class with an attendance or participation requirement, please let your teacher know and apply for [special consideration](#) through the [Special Consideration portal](#). To advise the University of a positive COVID-19 test result or if you suspect you have COVID-19 and are being tested, please fill in this [form](#).

UNSW requires all staff and students to follow NSW Health advice. Any failure to act in accordance with that advice may amount to a breach of the Student Code of Conduct. Please refer to the [Safe Return to Campus](#) guide for students for more information on safe practices.

### Dates to note

Important Dates available at: <https://student.unsw.edu.au/dates>

## Student Responsibilities and Conduct

Students are expected to be familiar with and adhere to all UNSW policies (see <https://student.unsw.edu.au/policy>), and particular attention is drawn to the following:

### Workload

It is expected that you will spend at least **15 hours per week** studying a 6 UoC course, from Week 1 until the final assessment, including both formal classes and *independent, self-directed study*. In periods where you need to complete assignments or prepare for examinations, the workload may be greater. Over-commitment has been a common source of failure for many students. You should take the required workload into account when planning how to balance study with employment and other activities.

### Attendance

Regular and punctual attendance at all classes is expected. UNSW regulations state that if students attend less than 80% of scheduled classes they may be refused final assessment.

### Work Health and Safety

UNSW policy requires each person to work safely and responsibly, in order to avoid personal injury and to protect the safety of others.

## Special Consideration and Supplementary Examinations

You must submit all assignments and attend all examinations scheduled for your course. You can apply for special consideration when illness or other circumstances beyond your control interfere with an assessment performance. If you need to submit an application for special consideration for an exam or assessment, you must submit the application **prior to the start** of the exam or before the assessment is submitted, except where illness or misadventure prevent you from doing so. Be aware of the “fit to sit/submit” rule which means that if you sit an exam or submit an assignment, you are declaring yourself well enough to do so and cannot later apply for Special Consideration. For more information and how to apply, see <https://student.unsw.edu.au/special-consideration>.

## Administrative Matters

On issues and procedures regarding such matters as special needs, equity and diversity, occupational health and safety, enrolment, rights, and general expectations of students, please refer to the School and UNSW policies:

<https://student.unsw.edu.au/guide>

<https://www.engineering.unsw.edu.au/electrical-engineering/resources>

## Image Credit

Synergies in Sound 2016

## CRICOS

CRICOS Provider Code: 00098G

## Acknowledgement of Country

We acknowledge the Bedegal people who are the traditional custodians of the lands on which UNSW Kensington campus is located.

## Appendix: Engineers Australia (EA) Professional Engineer Competency Standard

Program Intended Learning Outcomes	
Knowledge and skill base	
PE1.1 Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline	✓
PE1.2 Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline	✓
PE1.3 In-depth understanding of specialist bodies of knowledge within the engineering discipline	✓
PE1.4 Discernment of knowledge development and research directions within the engineering discipline	✓
PE1.5 Knowledge of engineering design practice and contextual factors impacting the engineering discipline	✓
PE1.6 Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline	✓
Engineering application ability	
PE2.1 Application of established engineering methods to complex engineering problem solving	✓
PE2.2 Fluent application of engineering techniques, tools and resources	✓
PE2.3 Application of systematic engineering synthesis and design processes	✓
PE2.4 Application of systematic approaches to the conduct and management of engineering projects	✓
Professional and personal attributes	
PE3.1 Ethical conduct and professional accountability	
PE3.2 Effective oral and written communication in professional and lay domains	✓
PE3.3 Creative, innovative and pro-active demeanour	✓
PE3.4 Professional use and management of information	✓
PE3.5 Orderly management of self, and professional conduct	✓
PE3.6 Effective team membership and team leadership	✓