TELE9752

Network Operations and Control

Term 3, 2022

Course Overview

Staff Contact Details

Convenors

Name	Email	Availability	Location	Phone
Vijay Sivaraman	vijay@unsw.edu.au	Tuesday	G17-443	93856577

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 introduces the principles, techniques, and tools used for the management of modern communication networks such as the Internet. The five major functional areas of network management are discussed: configuration management for configuring the hardware and software on network elements, performance management for measuring and controlling network performance, fault management for detecting and responding to fault conditions in the network, security management for securing and controlling access to resources in the network, and accounting management for tracking and logging network usage.

Course Learning Outcomes

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

Learning Outcome	EA Stage 1 Competencies
1. Describe the five functional areas (FCAPS) of network management in terms of the problems that arise in each functional area and in terms of the technologies that are used to address those problems.	PE1.1, PE1.5, PE3.2
2. Construct Management Information Bases (MIBs) and YANG models that describe the information used to manage network elements and network protocols.	PE1.3, PE2.1, PE3.3
3. Use software APIs to configure network elements and extract telemetry from them.	PE1.3, PE2.2, PE3.1
4. Describe the main features of significant standards for network operations and control.	PE1.3, PE3.4
5. Assess recent developments in automated network operations and control methods.	PE1.4, PE2.2, PE3.3

Teaching Strategies

Please refer to the information in Moodle

Additional Course Information

The pre-requisite for this course is TELE3118 Network Technologies. It is essential that you are familiar with the functions of the various layers in the TCP/IP protocol stack before this course is attempted. It is highly desirable that you be familiar with the roles of various network devices (switches, routers, firewalls, etc.) and the main protocols used for network communication before this course is attempted. Some prior knowledge of network performance, network security, and network architecture, covered respectively in courses TELE4642 "Network Performance", TELE3119 "Trusted Networks", and GSOE9758 "Network Systems Architecture" respectively, will be useful, though is not essential for this

course. It is further assumed that students have good computer literacy.

Assessment

Assessment task	Weight	Due Date	Course Learning Outcomes Assessed
1. Mid-Session Exam	30%	11/10/2022 08:00 PM	1, 2, 4, 5
2. Final Exam	50%	Not Applicable	1, 2, 4, 5
3. Project	20%	19/11/2022 09:00 PM	2, 3, 5

Assessment 1: Mid-Session Exam

Start date: 11/10/2022 07:00 PM
Assessment length: 1 hour
Due date: 11/10/2022 08:00 PM

Mid term test

Assessment 2: Final Exam

Final exam.

Assessment 3: Project

Start date: 18/10/2022 06:00 PM
Due date: 19/11/2022 09:00 PM

A group presentation (10%) and a final report (10%)

Group presentations will be individually moderated.

Attendance Requirements

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

Course Schedule

[View class timetable](#)

Timetable

Date	Type	Content
O-Week: 5 September - 9 September	Web	Review course outline
Week 1: 12 September - 16 September	Lecture	Introduction to Network Management & FCAPS
Week 2: 19 September - 23 September	Lecture	Network design and configuration
Week 3: 26 September - 30 September	Lecture	MIB & SNMP
Week 4: 3 October - 7 October	Lecture	Yang/Netconf and Programmability
Week 5: 10 October - 14 October	Assessment	Mid-Term test
	Assessment	Mid-Session Exam
Week 6: 17 October - 21 October	Lecture	Network management at scale
Week 7: 24 October - 28 October	Lecture	Network Performance and Telemetry
Week 8: 31 October - 4 November	Lecture	Network Faults
Week 9: 7 November - 11 November	Assessment	Softwarisation at Scale
Week 10: 14 November - 18 November	Assessment	Project presentations and review

Resources

Prescribed Resources

Prescribed textbooks:

- A. Radford et al: Cisco IOS XE Programmability, Cisco, 2018. Available online at: https://www.cisco.com/c/dam/en/us/products/collateral/enterprise-networks/nb-06-ios-xe-prog-ebook-cte-en.pdf
- Google: Site Reliability Engineering: How Google Runs Production Systems, 2016. Available online at: https://landing.google.com/sre/books/

Recommended Resources

Recommended Reference books:

- A. Clemm: Network Management Fundamentals, Cisco Press, 2007.
- D. Comer: Automated Network Management Systems: Current and Future Capabilities, Pearson, 2007.
- M. Subramanian: Network Management: Principles and Practice, Addison Wesley, 2000.

All course material and announcement will be at: https://subjects.ee.unsw.edu.au/tele9752/

Course Evaluation and Development

This course is under constant revision in order to improve the learning outcomes for all students. Please forward any feedback (positive or negative) on the course to the course convener or via the online student survey myExperience. You can also provide feedback to ELSOC who will raise your concerns at student focus group meetings. 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.

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

Disclaimer

This Course Outline sets out description of classes at the date the Course Outline is published. The nature of classes may change during the Term after the Course Outline is published. Moodle should be consulted for the up-to-date class descriptions. If there is any inconsistency in the description of activities between the University timetable and the Course Outline (as updated in Moodle), the description in the Course Outline/Moodle applies.

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	