1 Aims

The aim of TELE9752 is to develop student understanding of how telecommunication networks are operated and controlled. That is, whereas other networking courses focus solely on the technologies that enable users to transfer information across a network (e.g. TELE3118 focuses on network protocols, and TELE9751 focuses on the design of network equipment), this course considers how such technologies can be operated and controlled by people concerned with providing network services (e.g. network administrators).

1.1 Learning outcomes

By the end of this course, students should be able to:

• Describe the functional areas 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.
• Construct Management Information Bases that describe the information used to manage typical network protocols.
• Be familiar with standards for network operations and control.
• Access and assess recent developments in network operations and control research.

This course contributes to the following UNSW Graduate Attributes:

• the skills involved in scholarly enquiry;
• an in-depth engagement with the relevant disciplinary knowledge in its interdisciplinary context;
  • TELE9752 focuses on the discipline of network operations and control, and its contexts of broader IT and business management, network protocols, and engineering methods.
• the capacity for analytical and critical thinking and for creative problem solving;
• the ability to engage in independent and reflective learning;
  • TELE9752 fosters critical thinking and independent and reflective learning by rewarding, through its assessment criteria, students who explicitly articulate questions and answers about course material.
• Information Literacy – the skills to locate, evaluate and use relevant information;
• the skills required for collaborative and multidisciplinary work;
• the skills of effective communication.
  • TELE9752 includes group research about a research paper in the area of Network Operations and Control. This activity, in particular, will develop student capacity to locate, evaluate and use relevant information, to collaborate with peers, and to effectively communicate.
1.2 Syllabus

From the UNSW Course Handbook [http://www.handbook.unsw.edu.au/postgraduate/courses/2012/TELE9752.html]:

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.

2 Context

Programs: TELE9752 is part of the Telecommunications Specialisation Area of multiple programs (program codes in parenthesis):

- Master of Engineering Science (8538)
- Master of Engineering Science Extension (8539)
- Graduate Diploma of Engineering Science (5338)

It may also be chosen as an elective in other programs, e.g. the Bachelor of Engineering in Telecommunications program (code 3643) and the Doctor of Philosophy program (code 1640).

Several other UNSW courses relate to TELE9752:

Prerequisites: Background from an introductory networking course like UNSW's TELE3118

Complementary: TELE3119 covers network security in more depth, whereas this course only covers securing of network management systems and management of security systems. TELE4642 considers network performance in depth. TELE9751 covers the internal design of the devices that this course considers the control of, and TELE9756 considers advanced aspects of networking.

Following: TELE9752 is not a prerequisite for any other UNSW course, although students may wish to follow TELE9752 with complementary courses.

Old: TELE9303 Network Management is the predecessor of TELE9752.

TELE9752 is worth 6 Units of Credit (UOC). “The normal workload expectations of a student are approximately 25 hours per Semester for each UOC” [https://my.unsw.edu.au/student/atoz/UnitsOfCredit.html]

The design of this course has been informed by the following publications:

- M. Ulema: "Design and implementation of a network management course for undergraduate information systems students", Information Systems Education Journal
3 Teaching staff
The Lecturer for this course is Dr Tim Moors. http://www2.eet.unsw.edu.au/~timm/

4 Delivery
Classes will be held on Tuesday evenings from 6-9pm in room 418 of the EE&T building. The Lecturer encourages you to participate during lectures by asking and answering questions.

5 Course materials
The prescribed textbook for this course is

A. Clemm: Network Management Fundamentals, Cisco Press, 2006

This textbook will be supplemented by Recommended Reading which will available through the course web page. PDF copies of lecture notes will also be available through the course web page.

6 Communication channels

Email: You can email the Lecturer of this course at t.moors AT unsw.edu.au. Such emails must include the phrase “tele9752” in the subject line. Email can be used for administrative matters, but technical questions arising from the content of the course should be raised orally during consultation time.

Consultation: The Lecturer is available for consultation during breaks between lectures on lecture nights, and in his office (341 of the EE&T building) only at consultation times which are to be announced. Note: To assist in making the course wiki a repository of questions and answers about the course, if you wish to ask a question during consultation time then you must first post it on the course wiki before the Lecturer can discuss it with you during consultation time.

Notifications to students: Notifications to students about this course will be made orally during lectures, may be posted on the course web page (which you are expected to check at least once per week), and may be emailed to your student email address, e.g. z1234567@zmail.unsw.edu.au (which you are expected to check at least once per day and to maintain so that messages sent to your student email address do not bounce).

Course web page: http://subjects.ee.unsw.edu.au/tele9752/

Blackboard: This course will use Blackboard for disseminating marks, and submitting assignments and evaluations. UNSW's Blackboard system can be accessed through http://lms-blackboard.telt.unsw.edu.au/. If you cannot access Blackboard, then see http://telt.unsw.edu.au/blackboard/content/default.cfm?ss=0 for support.

Wiki: This course will use, and develop a wiki at http://tele9752.wikia.com. By editing Wikia, you agree to license any text you add under the Creative Commons Attribution-Share Alike License 3.0 (Unported).
7 Schedule

A tentative schedule for TELE9752 is:

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Network Management Systems</td>
</tr>
<tr>
<td>2</td>
<td>Revisiting protocol stacks in context of management</td>
</tr>
<tr>
<td>3</td>
<td>Structuring &amp; presenting management information (SMI, OIDs, MIBs, ASN.1, BER)</td>
</tr>
<tr>
<td>4</td>
<td>Communicating management information (SNMP, syslog)</td>
</tr>
<tr>
<td>5</td>
<td>Mid-session exam</td>
</tr>
<tr>
<td>6</td>
<td>Remote Monitoring (RMON)</td>
</tr>
<tr>
<td>7</td>
<td>Fault Management: Dependability and Event correlation</td>
</tr>
<tr>
<td>8</td>
<td>Security Management</td>
</tr>
<tr>
<td>9</td>
<td>Configuration management</td>
</tr>
<tr>
<td>10</td>
<td>Accounting management</td>
</tr>
<tr>
<td>11</td>
<td>Performance management</td>
</tr>
<tr>
<td>12</td>
<td>Student presentations on advanced topics</td>
</tr>
</tbody>
</table>

The first half of the course focuses on the information and protocols involved in Network Operations and Control, while the second half focuses on the five functional areas of NOC (FCAPS: Fault, Configuration, Accounting, Performance, and Security management).

8 Assessment methods and tasks

8.1 Synopsis

<table>
<thead>
<tr>
<th>Weighting</th>
<th>Task</th>
<th>Due date</th>
</tr>
</thead>
<tbody>
<tr>
<td>70%</td>
<td>Examinations</td>
<td></td>
</tr>
<tr>
<td>30%</td>
<td>Mid-session exam</td>
<td>in week 5</td>
</tr>
<tr>
<td>40%</td>
<td>Final exam</td>
<td>in Examinations Period</td>
</tr>
<tr>
<td>20%</td>
<td>Assignments</td>
<td></td>
</tr>
<tr>
<td>10%</td>
<td>Exercise</td>
<td>end of week 12</td>
</tr>
<tr>
<td>10%</td>
<td>Wiki assignment</td>
<td>end of week 8 to receive descriptive feedback</td>
</tr>
<tr>
<td></td>
<td></td>
<td>end of week 12 to receive marks</td>
</tr>
<tr>
<td>10%</td>
<td>Group research</td>
<td>in week 12 class</td>
</tr>
<tr>
<td>10% extra</td>
<td>Bonus for course improvement</td>
<td>before Final exam</td>
</tr>
</tbody>
</table>

8.2 Examinations

The bulk (70%) of the assessment will take the form of two closed-book examinations. The mid-session exam, held in week 5, is intended to give you timely feedback about your individual performance.
If you require special consideration for an examination, then follow the procedures described at [https://my.unsw.edu.au/student/atoz/SpecialConsideration.html](https://my.unsw.edu.au/student/atoz/SpecialConsideration.html). Pay particular attention to the need to apply within 3 days of the date of the examination for which you seek special consideration, and note that any alternate assessment given to recipients of special consideration may be conducted orally and will be no easier than the original assessment. Any supplementary final exam will likely be held in week 18 (6 weeks after the last week of session), and you should particularly consider this if you are planning to travel. The school policy for offering supplementary exams is described at [http://scoff.ee.unsw.edu.au/information/AcademicIssues.htm#Supplementary](http://scoff.ee.unsw.edu.au/information/AcademicIssues.htm#Supplementary).

*Final Exam Paper Inspection Session:* A Final Exam Paper Inspection Session will be held after results are released (the course web page will provide the exact date by the time that results have been released). If you wish to inspect your Final Exam paper during this Inspection Session, then you must tell the Lecturer via email within one week of the release of results.

### 8.3 Exercise

In the exercise, you will use the concepts (e.g. of management information and protocols) taught in the course to operate and control real network equipment. The exercise adds a particularly practical aspect to the course.

### 8.4 Wiki

In the Wiki assignment, you will create wiki pages that summarise the main concepts in this course and extend the wiki to cover other relevant topics that interest you. The wiki explicitly requires you to link concepts to each other and to concepts that are covered outside of this course.

### 8.5 Group research

The final 10% of the assessment will be for a group activity about a research paper in the area of Network Operations and Control. The output of the activity will take the form of a presentation to be made in class in week 12 and a wiki page about the research paper. The intention of this assessment item is to develop skills in learning about the latest advances in Network Operations and Control, while also developing group work and communication skills. Your mark will reflect your own contribution to your group, as well as the output of your group as assessed by both the lecturer and class.!!! feedback!!!

### 8.6 Bonus for course improvement

Students are encouraged to propose realistic ways to improve the course, and may be rewarded for such proposals by receiving a bonus mark (that adds to the 100% potential marks from other assessment tasks) of up to 10%. Such contributions (be they questions, answers, comments, pointers to useful course material, etc) must be made before the Final Exam.
8.7 Assessment requirements

Material submitted for assessment must:

- Be submitted before the deadline
- Be original work by the student and not include plagiarism - see Section 10.1
- Be self-contained in that it can be fully understood independent of course materials (e.g. lecture notes)
- Demonstrate skills and knowledge that are developed by the course.

9 Other matters

9.1 Academic Honesty and Plagiarism

Plagiarism is the unacknowledged use of other peoples work, including the copying of assignment works and laboratory results from other students. Plagiarism is considered a serious offence by the University and severe penalties may apply. You are expected to be familiar with what plagiarism is, and how to avoid it: [http://www lc.unsw.edu.au/plagiarism](http://www.lc.unsw.edu.au/plagiarism). Students who have been found to have plagiarised in a TELE9752 assessment item may have the maximum number of marks for that assessment item subtracted from their overall course mark, e.g. -10% if you have been found to have plagiarised in your wiki assignment.

9.2 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 policies: [http://scoff.ee.unsw.edu.au/](http://scoff.ee.unsw.edu.au/)

9.3 Continual Course Improvement

Students are advised that the course is under constant revision in order to improve the learning outcomes of its students. Students are encouraged (in part by the potential for a bonus mark of up to 10%) to forward any feedback (positive or negative) on the course to the Lecturer. An example of the impact of student comments on course improvement is the introduction in 2012 of an exercise in which you will apply network management techniques and technologies to a testbed of real equipment, which comes in response to student requests for more “practical” components for the course.