Tele9756 Advanced Networking
Course Outline 2009

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Course Aim
The main aim of this course is to develop a solid understanding of the key concepts and principles behind topical research issues in communication networks.

Course Overview
This course is for 6 Units of Credit and aimed at Graduate Engineers and wishing to understand topical research issues in communication networks. This course provides advanced knowledge of telecommunication networks currently being deployed or likely to be deployed in the future. It focus will be on material drawn from the recent research literature with a particular focus in the following three areas: network-to-network interface issues related to quality of service and reliability; cross-layer optimization issues related to network efficiency; and the control and management of mobility in networks. An optional new part of this course introduced this year will be the study of some papers in the emerging area of quantum networks.
**Syllabus:**

The course will largely cover areas of research related to network-to-network interface issues related to quality of service and reliability; cross-layer optimization issues related to network efficiency; and the control and management of mobility in networks. There will be no class text – rather the student will be given a list of research papers in the above areas for study and subsequent discussion in class.

1. Introductory overview. This is a short lecture (1 hour), which provides an overview of the course. There will be plenty of time for you to ask your questions all aspects of the course.
2. Mesh Networks
3. Cross layer Design
4. Emerging new 802.11 standards
5. VoIP for Wireless networks
6. Midterm Exam
7. – 12. Student presentations

**Text(s) and Reference(s):**

The class will not follow any text book as the study material is based on research papers. It will be assumed however, that you are already very familiar with standard networking material such as that given in classic networking text books such as


A list of research papers covered by the class will be finalized by week 3. Students will have the opportunity to influence the selected list of papers.

**Course Objectives & Learning Outcomes**

At the end of the course students should:

a) Understand the theory, concepts and challenges of research in telecommunication networks
b) Understand the theory, concepts and challenges of emerging wireless networks
c) Understand how applications actually operate over communication networks
d) Be able to design and simulate the behavior of communication networks
e) Be able to carry out calculations which determine the performance of a communication network
f) Be able to read and understand telecommunications research papers appearing in engineering journals
Teaching Methods & Strategies

Lectures = 3hrs/week

For this course your participation in class is vital. There will be a short class quiz most weeks based on the previous week’s class material. In addition, you will be asked to present (in collaboration with a nominated partner) a review of some research paper related to the class material. Given the advanced nature of this class it will be very difficult for you to keep up with the material unless you regularly attend class.

Relation to other Courses:

This course is related to other communication courses offered by Electrical Engineering in that it builds on concepts and principles introduced in all the undergraduate and graduate course in computer networking, and applies them to topical research issues. This course assumes that you already have an understanding of computer networks consistent with that possessed by a student who has a BE in Telecommunications from EE&T at UNSW.

Graduate Attributes:

This course will impact on the following graduate attributes

1. Development of skills involved in scholarly enquiry
2. Capacity for analytical and critical thinking and for creative problem-solving
3. The ability to engage in independent and reflective learning
4. Information literacy - the skills to appropriately locate, evaluate and use relevant information
5. An appreciation of, and a responsiveness to, change
### Attendance at Lectures

You are strongly encouraged to attend all class lectures. This is especially the case for this class as you will be presented with brand new concepts that you have likely never come across before. This makes the class very interesting for you – but it does require your participation in class. There will be no formal notes handed out that covers all the class material in detail, There will be power-points put on the class web site for download but these will not be sufficient for you to cover the class material. The lectures will consist of some power-point presentations, discussion of material in prescribed texts, and discussion of case studies. You are strongly encouraged to participate in class by interacting through questions and discussions of class material, and to prepare before class by reading relevant work packages ahead of time. There will be plenty of problem sets that will be reviewed in class. There may be guest lecturers.

### Assessment Weighting

- **Final Examination (50%)**: The examination is of two-hour duration, covering all aspects of the course that have been presented in lectures, tutorials, and labs. This exam will assess both understanding and analytical skills. You must pass this exam to pass course.

- **Optional Examination by Assignment A (50%)**. Instead of sitting a Final Examination a student may opt to take an examination by pursuing an additional extra individual assignment. The student must still do Assignment B (and all other part of the course other than final exam)if this option taken. Assignment A will be done on an **individual basis only** and will involve some computer modeling (e.g. Matlab, Opnet, Java, C++, or C, etc) related to a research paper chosen by the student. This option must be chosen by week 6, and the chosen assignment is subject to approval by Lecturer-in-charge. It is expected that this report will take you a roughly 20 days of work). This optional assignment cannot be on work related to other classes or part of any other research work you are doing for credit (i.e. no ‘double dipping’). You will not be given your mark for this assignment prior to the final examination. More details of this option in class.

- **Mid-Session Test (25%)**: The mid-session test will last 45 minutes and will be held in week 7. It will cover material covered in the course in week 1 to 6, and will test your conceptual understanding of this material, as well as your ability to apply the concepts to solving problems. This is compulsory test. There are zero marks for non-attendance at the mid-term.

- **Assignment B (20%)**: Each student will join with another student to form a group of two. This group will be charged with reviewing a research paper chosen from a list (to be given in class). The group will present a powerpoint presentation of the research paper (20 mins) as well as a 10 page written report on the paper.
- **Class Quizzes (5%).** Short (15 min pass/fail) quizzes will be held at beginning of each class (you will be informed of quiz times in class. You will be tested on the previous week’s class material. Each quiz will be worth 0.5% of final class mark. You can obtain only a max of 5% for these quizzes.
- **Bonus marks:** Some bonus marks may be available (max 5%) for additional class participation, such as asking/answering good questions – details in class.

### Course Evaluation

All students will be given the opportunity to provide feedback on the course. You are strongly encouraged to participate in this, especially as this is the first time the course is offered. Teaching staff take such feedback seriously and use it to improve the course delivery for subsequent lectures.

### Consultations

Please make an appointment for consultation at other times beyond standard class consultations through e-mail to r.malaney@unsw.edu.au (all email must be from a UNSW student account). Standard consultation time will be given in class.

### Other Course Resources

Please see class web site [https://subjects.ee.unsw.edu.au/tele9756](https://subjects.ee.unsw.edu.au/tele9756) for other material. It is expected and assumed that you will check this web site at least once per week for important class announcements.

**Plagiarism is strictly prohibited.**