Switching Systems Architecture
TELE 9751
Course Outline
Important Notice

The material contained in this study guide is in the nature of general comment only and is not advice on any particular matter. No one should act on the basis of anything contained in this guide without taking appropriate professional advice upon the particular circumstances. The Publisher, the Editors, and the Authors do not accept responsibility for the consequences of any action taken or omitted to be taken by any person, whether a subscriber to this guide or not, as a consequences of anything contained in or omitted from this guide.
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### Course Overview

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Introduction to Switching

**Unit 2**  
Switching fabrics: Overview

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Switching fabrics: Time-division, Space-division

**Unit 4**  
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**Unit 5**  
Packet classification

**Unit 6**  
Buffering

**Unit 7**  
Traffic management and scheduling

**Unit 8**  
Bridges

**Unit 9**  
Prioritisation, Virtual LANs, Virtual Private Networks

**Unit 10**  
Signalling principles  
SS7 signalling and public telephone networks  
Early public data networks: X.25, End-to-end arguments, Frame Relay

**Unit 11**  
Asynchronous Transfer Mode

**Unit 12**  
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**Unit 13**  
Integrated Services (RSVP) and Differentiated Services

§ 1 of this course (units 1-4) examines centralised switching fabrics – the core switching function.  
§ 2 of this course (units 5-7) examines functions that may surround switching fabrics.  
§ 3 of this course (units 8-13) examines distributed switching systems and their protocols.
Introduction

This course provides detailed knowledge of the design of equipment and protocols used to build communication networks such as the Internet. The course has five parts: 1. Switches: The motivations for switched networks, and the fabrics that provide the core switching function inside switches and routers. This includes time- and space-division switches, and all-optical switches. 2. Algorithms and techniques for implementing other functions of switches and routers, such as packet classification, buffering, and traffic management. 3. Protocols used between switches and routers, such as the Spanning Tree Protocol and bridges, signalling protocols, fast packet switching and tag switching. 4. Other internetworking devices, e.g. caches, load balancers, and layer 4/7 switches. 5. Design of networks in terms of dimensioning links and nodes (equipment) in order to achieve performance objectives.

About the course

Assumed knowledge and skills

To successfully undertake this course it will be assumed that you have knowledge and skills in

- None, although prior experience from (or concurrent enrolment in) TELE 3118, COMP 3331 or TELE 9302 is desirable.

Recommended text

We recommend that you obtain, and read, the following text.

S. Keshav: An Engineering Approach to Computer Networks: ATM Networks, the Internet and the Telephone Network, Addison Wesley, 1997

Notes:
• This text is *recommended*, not required. You *may* find this useful if you want to read a single text that touches on many (but not all) of the topics treated in this course.
• Don’t misconstrue the publication date as indicating that the text is obsolete: It focuses on the fundamentals of networks, and the fundamentals that apply to switched networks have not changed substantially since the date of publication.
• This text will be supplemented by a reading list of recent and classic papers about switching system design.

Course web page

**URL:**  http://subjects.ee.unsw.edu.au/tele9751/
**Provides:**  Links to lecture notes and handouts, pointers to Recommended Reading. All important class information will be posted here. It is assumed you will read this web page prior to each class.
Assessment

The assessment for this course is designed to measure your achievement of the following learning outcomes:

Learning outcomes

When you have completed this course, you should be able to

- Appreciate the reasons for switching, and the relative merits of the possible switching modes, e.g. packet and circuit switching.

- Understand the principles of the internal design and operation of communication switches.

- Understand the essence of the key protocols that are used with switched networks, e.g. ATM, MPLS, RSVP and VPNs.

Your assessment tasks

Your mark for TELE 9301 will be calculated as the weighted sum of the following assessable material:

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<thead>
<tr>
<th>Weighting</th>
<th>Name</th>
<th>Date of issue</th>
<th>Due date</th>
<th>Date of return</th>
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<tr>
<td>75%</td>
<td>Exam</td>
<td>June/July</td>
<td>June/July</td>
<td>To be decided</td>
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<tr>
<td>25%</td>
<td>Mid-session test</td>
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<td>Week 7</td>
<td>Week 7</td>
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<td></td>
<td></td>
<td></td>
<td>(in class)</td>
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</tbody>
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**Bonus marks** may also be awarded for participation. “Participation” involves such activities as attendance, asking thought-provoking questions, and giving insightful answers to questions asked by other students. Students may also volunteer to give a presentation related to class material for which some bonus marks may apply. You can earn in total a maximum bonus of 5%.
Contacting the lecturer

The best way to contact the lecturer is during the lecture. Consultation times are also available. (details in class). Do not ask questions via email.
Plagiarism

[This section describes the standard UNSW policy on plagiarism, which has not been modified for this course.]

Plagiarism is the presentation of the thoughts or work of another as one’s own. *

Examples include:
- direct duplication of the thoughts or work of another, including by copying work, or knowingly permitting it to be copied. This includes copying material, ideas or concepts from a book, article, report or other written document (whether published or unpublished), composition, artwork, design, drawing, circuitry, computer program or software, website, Internet, other electronic resource, or another person’s assignment without appropriate acknowledgement;
- paraphrasing another person’s work with very minor changes keeping the meaning, form and/or progression of ideas of the original;
- piecing together sections of the work of others into a new whole;
- presenting an assessment item as independent work when it has been produced in whole or part in collusion with other people, for example, another student or a tutor; and,
- claiming credit for a proportion a work contributed to a group assessment item that is greater than that actually contributed.†

Submitting an assessment item that has already been submitted for academic credit elsewhere may also be considered plagiarism.

The inclusion of the thoughts or work of another with attribution appropriate to the academic discipline does not amount to plagiarism.

Students are reminded of their Rights and Responsibilities in respect of plagiarism, as set out in the University Undergraduate and Postgraduate Handbooks, and are encouraged to seek advice from academic staff whenever necessary to ensure they avoid plagiarism in all its forms.

The Learning Centre website is the central University online resource for staff and student information on plagiarism and academic honesty. It can be located at: www.lc.unsw.edu.au/plagiarism

The Learning Centre also provides substantial educational written materials, workshops, and tutorials to aid students, for example, in:
- correct referencing practices;
- paraphrasing, summarising, essay writing, and time management;
- appropriate use of, and attribution for, a range of materials including text, images, formulae and concepts.

Individual assistance is available on request from The Learning Centre.
Students are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting, and the proper referencing of sources in preparing all assessment items.

* Based on that proposed to the University of Newcastle by the St James Ethics Centre. Used with kind permission from the University of Newcastle
† Adapted with kind permission from the University of Melbourne.