INFOSYS 339: LANs, WANs and Wireless Infrastructure (15 POINTS)
Semester 1 (1173)

Course Prescription
Studies the design, implementation and management of reliable and scalable networks. Topics covered: Local Area Network (LAN), switching and Virtual LANs, Internet routing protocols, wireless switching, congestion control and quality of service (QoS). Introduces students to network performance analysis using network simulation software. Provides a pathway to complete the industry recognised CCNA (Cisco Certified Network Associate) certificate by including CCNA’s (Cisco Certified Network Associate) certificate by including CCNA’s Routing Protocols and Concepts’ and ‘LANSwitching and Wireless’.

Programme and Course Advice
Prerequisite: INFOSYS 224 or 322

Goals of the Course
• To introduce routing as a network layer function and routing protocols as the implementation of such function
• To familiarise students with basic router components and router configuration
• To review and discuss the main design issues associated with LAN design, switching and switch configuration.
• To introduce new Wide Area Network technologies such as Metro Ethernet.
• To present and discuss wireless LAN technologies from medium access techniques to transmission protocols to basic wireless network architectures
• To introduce the issues that surround quality of service (QoS) and congestion control in data networks
• To introduce students to network performance analysis using network simulation software.
• To understand management implications of network design and implementation phases and the testing of the proposed design through the use of a network performance simulator.

Learning Outcomes
By the end of this course it is expected that the student will be able to:

1. understand the main issues associated routing, routers and routing protocols;
2. understand the main issues associated with virtual local area networks, switching, and LAN internetworking;
3. understand recent developments in WAN technologies; in particular Metro Ethernet, with a knowledge of architecture, implementation, and benefits and disadvantages;
4. understand how IEEE-802-based wireless local networks operate.
5. discuss and understand issues related to congestion control and quality of service, and,
6. understand and learn the use of a network performance simulation software tool.
## Content Outline (Tentative)

<table>
<thead>
<tr>
<th>Week</th>
<th>Class Schedule</th>
<th>Lab Schedule</th>
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| 1    | Intro to Infosys 339  
Introduction to Network Performance Simulation (I) | Introduction to Network Performance Simulation |
| 2    | LAN Design | Session 1: CCNA Administration  
Session 2: Chapter 1 - LAN Design and the Switched Environment |
| 3    | Switching VLAN | Final CCNA1 Exam (5%)  
Session 1: Chapter 2 - Basic Switch Configuration and Basic Switch Security  
Session 2: Prepare Lab Skill Assessment 1 on Port Security and Secure Shell |
| 4    | Submit Assignment 1  
VLAN Network Performance Simulation (II) | Session 1: Lab Skill Assessment 1* (5%)  
Session 2: Chapter 3 - VLAN segmentation, implementation and security |
| 5    | STP Routing (network layer) | Session 1: Chapter 5 - Inter-VLAN routing on Packet Tracer  
Session 2: Inter-VLAN routing (on physical devices) |
| 6    | Routing (network layer)  
Mid-term test | Session 1: Chapter 6 - Static routing  
Session 2: Chapter 7 - Introduction to dynamic routing |

### Mid-term Break

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<th>Week</th>
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| 7    | Routing | Session 1: Chapter 8 - Dynamic routing with OSPF  
Lab Skill Assessment 2* (5%) |
| 8    | TCP Congestion Control | Session 1: Chapter 9 - Introduction to access lists |
| 9    | Wireless networks – WiFi | Lab Skill Assessment 3* (5%)  
Packet Tracer assessment: inter-VLAN routing |
| 10   | Network Performance Simulation (III) | Session 1: Chapter 10 - DHCP  
Session 2: Chapter 11 - NAT |
| 11   | Wide Area Network Technologies | Lab Skill Assessment 4* (5%) – RSE Integrated Skill Challenge |
| 12   | Conclusion | Final CCNA 2 Exam (10%) |

(*) Lab Skills (best 3 out of 4)

## Learning and Teaching

The course is delivered within the following components:

- **Lectures:** 1x2-hour lecture per week + 1x1-hour lecture per week
- **Laboratories:** 1x2-hour laboratory (mandatory) per week based on hands-on tasks in the context of data networks
- **Online Curriculum:** Weekly Cisco on-line module exams to test students on the content covered during mandatory lab sessions. Complete Cisco module contents will be assessed through a specific multi-choice, multi-answer test.
- **Mid Term test:** Written test
- **Final Exam:** Written test
- **Case Study:** Group project
- **Self-Study:** Students are expected to learn any online curriculum content that is not covered in the prescribed textbook, or discussed in lectures based on self-study
Teaching Staff

Course Director and Lecturer
Associate Professor  **Fernando Beltrán**
Room 472, OGG Building
f.beltran@auckland.ac.nz
Extn: 87850
Office Hours: TBA

Learning Resources

**Prescribed Textbook**


**Online Curriculum** – Weekly posted class presentations (PDFed Power Point files) on Canvas

1. Weekly posted lab practices
2. Cisco on-line material  http://cisco.netacad.net

**Other references**


Graziani, R – Cabrillo College, http://www.cabrillo.edu/~rgraziani/

Workstations/Hubs/Switches/Routers/Cables - Provided in lab

**Assessment**

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<tr>
<th>Learning Outcome</th>
<th>Mid Semester Test</th>
<th>Case Study</th>
<th>Cisco Modules and Exam</th>
<th>Final Exam</th>
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Total: 100%

Requirements to pass INFOSYS 339

All students MUST PASS the Final Examination component in order to PASS the paper. Students are NOT required to pass each individual coursework component, but MUST achieve a passing mark when the respective marks are aggregated (i.e. 50 or more out of 100).