

## Course Outline 2017

### **INFOSYS 322: Data Communications and the Internet (15 POINTS) Semester 2 (1175)**

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#### Course Prescription

Examines topics related to the Internet and communication networks, with an overall focus on the Internet layered model, and services and capabilities that IT infrastructure solutions enable in an organisational context to revolutionise business. This course provides an entry pathway to the industry recognised CCNA certificate by including content from 'CCNA R&S: Introduction to Networks' of the Cisco Networking Academy Programme.

#### Programme and Course Advice

Prerequisite: INFOSYS 110 or 120 or INFOMGMT 192 or COMPSCI 101

#### Goals of the Course

- To familiarise students with the fundamental concepts and terminology of computer communications
- To prepare students to understand the design considerations of communications systems.
- To allow students to work with the basic components of networks: cabling systems, test kits, hubs, switches and stations.
- To introduce the Internet Layered model and its components
- To familiarise students with basic operation and fundamental concepts that underlie each layer of the Internet hierarchical structure
- To introduce topics in IT Infrastructure: cloud computing, network security, carrier Ethernet and IT service management frameworks

#### Learning Outcomes

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

1. identify and describe the functions of basic components required to build data communication networks, both local area and wide area;
2. describe the process of converting information from its original form, to a form that can be transmitted through data networks;
3. discuss how different types of transmission media are affected by their physical characteristics and the role that multiplexing plays in data networks;
4. describe specific processes and functions that apply to a layered network model, with specific reference to the OSI reference model and TCP/IP;
5. subnet a network using multi-level subnetting and provide a subnetted IP design based on a given topology or business profile;

6. describe the process by which distance vector and link state routing protocols update information within a network;
7. understand the importance of DNS within the Internet; and
8. have an understanding of emerging issues for IT as it relates to networks and IT Infrastructure such as cloud and grid computing, and securing networks, carrier Ethernet and IT service management frameworks.

#### Content Outline:

Semester Week	Lecture Content	Lab Content
1	Course Introduction – Structure + Assessment Network Topologies, Protocols and Communications Layered Model, Encapsulation, Addressing	<u>Skills</u> Introduction: -Lab -Cisco Portal -Packet Tracer
2	PHYSICAL LAYER - Analog Signals Digital Signals + Transmission Impairment Transmission Time + Serial and Parallel Shannon Capacity Law	<u>Skills</u> Packet Tracer -Simple Network -Switches/Routers -PKA Files  CCNA (to be updated) 1-Exploring the Network
3	Async and Sync Multiplexing-TDM Packet vs Circuit Switching DATALINK LAYER - Data Link Control (DLC)	<u>Skills</u> Physical Lab -Switches/Routers -Putty/Console  CCNA (to be updated) 3-Network Protocols and Communication
4	DATALINK LAYER – Multiple access – ALOHA Introduction to ETHERNET Ethernet (MAC) address Finding a device's MAC address – ARP <b>MIDTERM TEST PART I</b>	<u>Skills</u> Packet Tracer -Static/Dynamic Routing
5	Carrier Sense Multiple Access networks (CSMA) - Collision Detection- Media Access Control (MAC) Hubs + Switches + Routers - Collision Domains	<u>Skills</u> <b>01-PT Challenge (10%)</b>  CCNA 4-Network Access

6	NETWORK LAYER - Logical Addressing IP v4 & v6 Addressing - Simplified Subnetting	Open Labs – Physical Equipment
7	NETWORK LAYER - VLSM Subnetting - IPv6 Introduction to Routing- Routing Protocols - Distance Vector – RIP	Skills Packet Tracer -IPv4 -Subnetting  CCNA 6-Network Layer
8	TRANSPORT LAYER - Port Addresses - Process TCP - Sliding Window – UDP	Skills Packet Tracer -IPv6  CCNA 7-Transport Layer
9	<b>MIDTERM TEST Part II</b> TRANSPORT LAYER: UDP - TCP - Flow Control - Connection oriented networks - Reliability	Skills <b>02-PT Challenge (10%)</b>  CCNA 8-IP Addressing
10	APPLICATION LAYER - DHCP-SMB-Telnet Email - FTP - HTTP	Skills Packet Tracer -DHCP -SSH -TFTP  CCNA 9-Subnetting
11	IT INFRASTRUCTURE – Network Security, Cloud Computing	Skills <b>03-PT Challenge (10%)</b>
12	IT INFRASTRUCTURE – IoT (Internet of Things)	Skills Packet Tracer - IoT

*NB: The flow of the course is intended to allow flexibility for the precise schedule of delivery ie. a topic that may be set to deliver in week 3 might extend to week 4, or a topic in week 9 may be covered in week 8.*

## Learning and Teaching

The course is delivered within the following components:

<b>Lectures:</b>	3x1-hour lectures per week
<b>Laboratories:</b>	1x2-hour laboratory per week based on hands-on tasks in the context of data networks
<b>Online Curriculum:</b>	Cisco Certified Networking Academy - includes online assessment.
<b>Mid Term test</b>	Written test in two parts: Part I and Part II
<b>Final Exam:</b>	Written test
<b>Self-Study:</b>	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

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Office Hours: Tuesday 11:00am - 12:00pm  
Wednesday 12:00 -1:00 p.m.

## Course Coordinator:

Fernando Beltran

## Lab Instructors

Wen-Kai (Joseph) Chen: [wche531@aucklanduni.ac.nz](mailto:wche531@aucklanduni.ac.nz)

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## Learning Resources

- **Prescribed Textbook (Students must have)**
  - Forouzan, B. (2013). *Data Communications and Networking (5th Ed)*. McGraw-Hill
  - ISBN-13 978-0-07-337622-6. Website: <http://www.mhhe.com/forouzan>
- **Lecture Notes** – These are provided online via Canvas

- **Online Curriculum**

- <http://cisco.netacad.net> (Links to an external site.)Links to an external site.
- Workstations/Hubs/Switches/Routers/Cables - Provided in lab

### Inclusive Learning

Students are urged to discuss privately any impairment-related requirements face-to-face and/or in written form with the course convenor/lecturer and/or tutor.

### Student Feedback

Based on previous student feedback, it is important to understand that this can be a challenging course. You will be challenged within the first two weeks to reflect on the content that has been delivered to date, and check to see if this is the right course for you to continue with.

### Assessment

Mid Semester Test (Parts 1 and 2)	30%
Lab Components	30%
Final Exam	40%
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Total	100%

### Requirements to pass INFOSYS 322

- Pass the Final Examination
- Achieve 50% or higher of the total marks allocated to the final examination and internal coursework.

### Notes

- Students are NOT required to pass each individual coursework component.

The broad relationship between these assessments and the course learning outcomes is as follows:

Learning Outcome	Mid Semester Test	Cisco Modules and Exam, Lab Activities	Final Exam
1	X	X	
2	X	X	X
3	X	X	X
4	X	X	X
5	X	X	X
6	X	X	X
7			X
8			X