

# CSC3407

# Network Fundamentals and Routing

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Faculty of Sciences  
Department of Mathematics and Computing

## Introductory/Study Book

Semester 1 2009

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## **Course Specification**

CSC3407 Course Website is:

<http://www.usq.edu.au/course/specification/2009/CSC3407-S1-2009-86227.html>



## Introduction

Welcome to CSC3407 *Network Fundamentals and Routing*!

This is an introductory course on computer networking and as such, it will cover a broad range of topics and in many cases the depth of detail will not be great. The focus of the course will be on the technologies and protocols that are used for the Internet, including the TCP/IP protocol family. The course is intended to be a mixture of theory and practice, the latter is by way of several hands-on practical work or simulated lab work.

It is strongly recommended that you enrol in this course before Week 3 of the semester otherwise you will have difficulties to catch up the substantial contents in the course.

Follow on courses include:

- CSC3427 *Switching, Wireless and WAN Technologies* (the second USQ Cisco CCNA Exploration Course)
- CSC3413 *Network Design and Analysis*
- CSC3420 *Mobile Internet Technology*
- CSC8415 *Computer Network Programming*
- CSC8407 *Wireless and Internet Technology*

## What can you get from this course?

This course incorporates with two courses in CCNA Exploration v4.0, *Network Fundamentals* and *Routing Protocols and Concepts*, in Cisco Networking Academy Program. USQ joined Cisco Networking Academy Program in 2006 and becomes a local academy training institution to run Cisco academy courses. In 2007, Cisco Networking Academies launched two new curricula, *CCNA Exploration* and *CCNA Discovery*. CCNA Exploration is designed for university students who have advanced problem solving and analytical skills. CCNA Exploration offers in-depth theory, challenging labs, and a detailed overview of protocol operations. It helps students prepare for successful IT careers in small-medium business, as well as enterprise and service provider environments.

There are four CCNA Exploration v4.0 courses. They are *Network Fundamentals*, *Routing Protocols and Concepts*, *LAN Switching and Wireless*, and *Accessing the WAN*. CSC3407 covers the contents of the first two courses. The second Cisco course, CSC3427 *Switching, Wireless and WAN Technologies*, covers the contents of the last two.

The Cisco courses will enhance you to get "ready to work" in a leading industry immediately after graduation. For more information about Cisco, please refer to the Cisco website on <http://www.cisco.com/>.

## Pathway to CCNA Certification

The Cisco Certified Network Associate (CCNA) certification indicates knowledge of networking for the small office, home office (SOHO) market, and the ability to work in small business or organisations using networks that have fewer than 100 nodes. CCNA is the industry standard, fundamental certification for networking careers. Students need to complete all four courses of CCNA Exploration to fully prepare for the CCNA exam.

A CCNA certified individual develops the skills necessary to fulfil the job responsibilities of network technicians, network administrators and network engineers. A certification holder can perform the following tasks:

- Install and configure Cisco switches and routers in multiprotocol internetworks using LAN and WAN interfaces.
- Provide level 1 troubleshooting service
- Improve network performance and security
- Perform entry-level tasks in the planning, design, installation, operation, and troubleshooting of Ethernet and TCP/IP networks.

## CCNA Exploration Network Fundamentals

Network Fundamentals is the first of four courses leading to CCNA designation and it has no prerequisites. It is a prerequisite for the other three courses. It introduces Cisco Networking Academy Program students to the networking field and is an important step toward achieving CCNA certification. Upon completion of CCNA Network Fundamentals, students will be able to perform tasks related to the following:

- Use network protocol models to explain the layers of communications in data network
- Design, calculate, and apply subnet masks and addresses
- Build a simple Ethernet network using routers and switches
- Employ basic cabling and network designs to connect devices
- Use Cisco CLI commands to perform basic router and switch configuration and verification
- Analyse the operations and features of the application, transport and network layer protocols

In addition, Network Fundamentals provides instructions and training with the proper care, maintenance, and use of networking software, tools and equipment.

## CCNA Exploration Routing Protocols and Concepts

After successful completion of Network Fundamentals, you can study Routing Protocols and Concepts. It is the preferred course second of four CCNA Exploration v4.0 courses leading to the CCNA designation. Routing Protocols and Concepts course describes the architecture,

components, and operation of routers, and explains the principles of routing and routing protocols.

Upon completion of this course, students will be able to perform tasks related to the following:

- Analyse, configure, verify, and troubleshoot the primary routing protocols RIPv1, RIPv2, EIGRP and OSPF.
- Compare and contrast classful and classless IP addressing
- Design and implement a classless IP addressing scheme for a network
- Be able to recognise and correct common routing issues and problems
- Router troubleshooting
- Identify the characteristics of distance vector routing protocols

CSC3407 has been designed for both curriculum contents and lab activities. Internal students will conduct the lab activities in Cisco Network Lab, Room C205, at USQ. External students will use a simulation software called *Packet Tracer* to practise lab work. Packet Tracer software can be downloaded from CSC3407 course website.

All students, especially internal students are encouraged to take final on-line exams of the first two Cisco CCNA Exploration v4.0 courses: Network Fundamentals and Routing Protocols and Concepts. *The online exams are scheduled on 17 April 2009 and 12 June 2009 at 3:00pm in computer labs K110 and K111 at USQ. Each on-line exam takes 2 hours, plus about 20 minutes extra time for on-line feedback questionnaires.*

## Course Website

You can access CSC3407 course website via the USQStudyDesk, at <http://usqstudydesk.usq.edu.au/course/>. It provides access to lecture notes, other reference materials, and the Announcements from the teaching staff. It should be accessed regularly to check for updates.

There are two assignments for CSC3407. Both assignment specifications will be posted on course website in Week 1, S1 2009.

There are substantial resources available for CSC3407 on the course website, including titles of many reference books for CCNA Exploration v4.0.

## Textbook

The prescribed texts for CSC3407 are:

1. **Network Fundamentals, CCNA Exploration Companion Guide**, by Mark A. Dye, Rick McDonald and Antoon W Ruffi, Published by Cisco Press on November 2007.  
ISBN-10: 1-58713-208-7  
ISBN-13: 9781587132087

**2. Routing Protocols and Concepts, CCNA Exploration Companion Guide**, by Rick Graziani and Allan Johnson, Published by Cisco Press on February 2008.

ISBN-10: 1-58713-206-0

ISBN-13: 9781587132063

Each of the above textbooks includes a CD containing Packet Tracer simulation files.

We will follow the books very closely and will cover most of the contents. The two books are very easy to read and will continue to be useful resources for years to come.

## Reference Books

There are numerous other books that can be read while studying this course.

- *Networking Basics CCNA 1 Companion Guide (Cisco Networking Academy Program)*, by Wendell Odom and Thomas Knott, Published by Cisco Press, 1<sup>st</sup> Printing, March 2006.
- *Routers and Routing Basics CCNA 2 Companion Guide (Cisco Networking Academy Program)*, by Wendell Odom and Rick McDonald, Published by Cisco Press, 1<sup>st</sup> Printing, July 2006.
- *CCNA Command Quick Reference (Cisco Networking Academy Program)*, By Scott D. Empson, Published by Cisco Press on April, 2005, ISBN-10: 1-58713-159-5;
- *CCNA 1 and 2 Lab Companion, Revised (Cisco Networking Academy Program)*, 3rd Edition, By Cisco Systems, Inc., Published by Cisco Press on 2004, ISBN-10: 1-58713-149-8.

## Internet Sites

There are many Internet Web sites that provide useful information for this course. By far the most important one is the Cisco website: <http://www.cisco.com/>. It includes information about Cisco and CCNA certification.

The Internet Engineering Task Force (IETF) at <http://www.ietf.org/> provides access to all the so-called Requests for Comments or RFCs. Follow the link to RFC pages to find and download an RFC Index or any particular RFCs.

## How to Study this Course

Refer to the Study Schedule for a week-by-week plan of what is to be studied. It is vital that you do not fall behind this schedule. Ideally you will actually get ahead of the schedule. In particular, you should try your best to get back on schedule if you start the course late due to other commitments.

For each week you should start by reading the contents in the textbook and then do the multiple choice questions under the Check Your Understanding at the end of each chapter. The answers are in Appendix. Don't look at the answers before you actually do the questions.

Pay close attention to the due dates of the two assignments and make sure that you start to work on these well before the due date.

## Study Schedule

Week	Module and Topic	Reading	Assignments
<b>1</b> 2-6 March	Module 1: - Living in a Network-centric World - Communications Over the Networks	Network Fundamentals: Chapter 1&2	
<b>2</b> 9-13 March	Module 2: - OSI Application Layer Functionality and Protocols - OSI Transport Layer	Network Fundamentals: Chapter 3&4	
<b>3</b> 16-20 march	Module 3: - OSI Network Layer - Addressing the Network: IPv4	Network Fundamentals: Chapter 5&6	
<b>4</b> 23-27 march	Module 4: - OSI Data Link Layer - OSI Physical Layer	Network Fundamentals: Chapter 7&8	
<b>5</b> 30-3 April	Module 5: - Ethernet - Planning and Cabling Networks - Configuring and Testing Your Network	Network Fundamentals: Chapter 9,10&11	
<b>6</b> 6-10 April	Break/Residential School		Assignment 1 due on 9 April 2009
<b>7</b> 13-17 April	Break/Residential School		CCNA1 on-line exam on at 3-6pm on 17 April 2009 in K110 and K111 at USQ (on-campus, optional)
<b>8</b> 20-24 April	Module 6: - Introduction to Routing and Packet Forwarding - Static Routing	Routing Protocols and Concepts: Chapter 1&2	
<b>9</b> 27 April - 1 May	Module 7: - Introduction to Dynamic Routing Protocols - Distance Vector Routing Protocols	Routing Protocols and Concepts: Chapter 3&4	
<b>10</b> 4-8 May	Module 8: - RIP version 1 - VLSM and CIDR	Routing Protocols and Concepts: Chapter 5&6	

<b>11</b> 11-15 May	Module 9: - RIPv2 - The Routing Table: A Close Look	Routing Protocols and Concepts: Chapter 7&8	
<b>12</b> 18-22 May	Module 10: - EIGRP - Link-State Routing Protocols	Routing Protocols and Concepts: Chapter 9&10	
<b>13</b> 25-29 May	Module 11: - OSPF	Routing Protocols and Concepts: Chapter 11	
<b>14</b> 1-5 June	Module 12: - Revision		Assignment 2 due on 5 June 2009
<b>15</b> 8-12 June	Review		CCNA2 on-line exam on at 3-6pm on 12 June 2009 in K110 and K111 at USQ (on-campus, optional)
<b>16-17</b> 15 – 26 June	Examination Period		

## Assessment

Your assessment consists of:

- Two assignments, worth a total of 40%.
- End of Semester examination worth 60%.

## Assignments

First and most important: **DO THE ASSIGNMENTS YOURSELF!** We cannot check to ensure that everyone works the assignments honestly (although, if we do detect copying or any other unfair means, assignments will be awarded zero marks). However, it is in your best interests to work these yourself; they have been designed to help you develop the skills and understanding necessary to master the material in the course.

Make sure you read the assignment questions ahead of time so that you can plan your studies to give adequate time to solve the problems.

Each assignment should be presented as a well formatted report. Refer to the marking scheme and note that some marks are allocated for the quality of your assignment presentation.

### Assignment Specifications

Both Assignment 1 and 2 specifications will be posted on course website, in Week 1, S1 2009.

## Examination

The examination will be a two hour CLOSED examination. It will cover all the contents in the two CCNA Exploration v4.0 textbooks, both in *Network Fundamentals* and *Routing Protocols and Concepts*.

## Support Services and Communication

### Student Enquiries

Before sending in your query, please decide whether it is an *academic* query or an *administrative* query.

**Academic** queries are those that concern the subject matter or its assessment, eg. Questions about something you don't understand in the textbook, assignment clarifications, extensions to assignment due dates, tutorial/practical questions.

**Administrative** queries concern all other aspects of university support for your study, eg. Enrolment details, receipt of study materials, time and place of exams.

Please make sure you send your query to the appropriate person: lecturers and tutors are ready to answer all academic queries but they cannot help you with administrative queries. Similarly, DEC staff and other administrative support staff cannot possibly help you with an academic query.

### Academic Queries

Email queries are preferred! You can email academic queries to:

**liyan@usq.edu.au**

Use this email address in preference to all other addresses when asking **academic** queries. They will usually get faster response than either telephone or normal mail.

**Do not email academic queries to Outreach.** All Outreach does is to pass them on to the lecturer, just the same as you could have done by sending directly to me as address above, except with a time delay and many layers of red tape.

Finally, before writing, please check the course web site for announcements, as we will be adding information there whenever we find a problem that is being commonly experienced.

### Administrative Queries

You should carefully read the information provided in this Introductory/Study Book concerning contact details and support services.

**USQAssist** is the most efficient method for requesting support assistance. It is a web self service facility for **all** students to:

- find answers to common questions;

- ask a question; and/or
- track the progress of a question.

By typing a keyword in the search field, you can find answers to many of the questions frequently asked by students, including course troubleshooters. To access *USQAssist*, go to <http://usqconnect.usq.edu.au/usqassist> or click on the 'Help' option at *USQConnect*.

**You can also ask for support by telephone or facsimile.**

### **For all Australian Citizens and all students enrolled through the Office of Continuing and Professional Education**

All administrative queries should be directed to the Distance Education Centre (DEC) Outreach Services or your Regional Liaison Officer. Outreach Services can be contacted as follows:

Telephone: 07 46312285

Fax: 07 46361049

Web Form: <http://usqconnect.usq.edu.au/usqassist>

Email: [outreach@usq.edu.au](mailto:outreach@usq.edu.au)

### **For International Students**

International students should contact their Local Support Office for further assistance. If there is no Local Support Office in your country you should contact the International Office at USQ as follows:

Telephone: 61 7 46312362

Fax: 61 7 46362211  
61 7 46359225

Web Form: <http://usqconnect.usq.edu.au/usqassist>

Email: [iosupport@usq.edu.au](mailto:iosupport@usq.edu.au)

## **USQConnect**

*USQConnect* is a computer system that enables you to access information, services and program resources on the Internet environment – the World Wide Web (WWW). To find out more about this dynamic environment we recommend you look at the following URL regularly:

**<http://usqconnect.usq.edu.au>**

Services that are provided via *USQConnect* include:

- access to electronic course materials (where appropriate),
- access to up-to-date library catalogues, electronic journals and articles, and text databases,
- secure access to your enrolment details, course assignment and end of semester results,
- Faculty information on departments, programs, policies, and staff details,
- access to the USQ*Assist* knowledge base – a list of common questions asked by students,
- Outreach Electronic Noticeboard for external students including Residential School and telephone tutorial timetables, learning circles and other information,
- communication facilities – email and discussion groups,
- opportunity to establish your home page.

## Course Electronic Discussion

A mailing list will be established for the course, through which discussion can take place between students and the lecturer/tutor. In order to subscribe, go to:

<http://usqstudydesk.usq.edu.au/course/>

You can browse all posting online at the above URL.