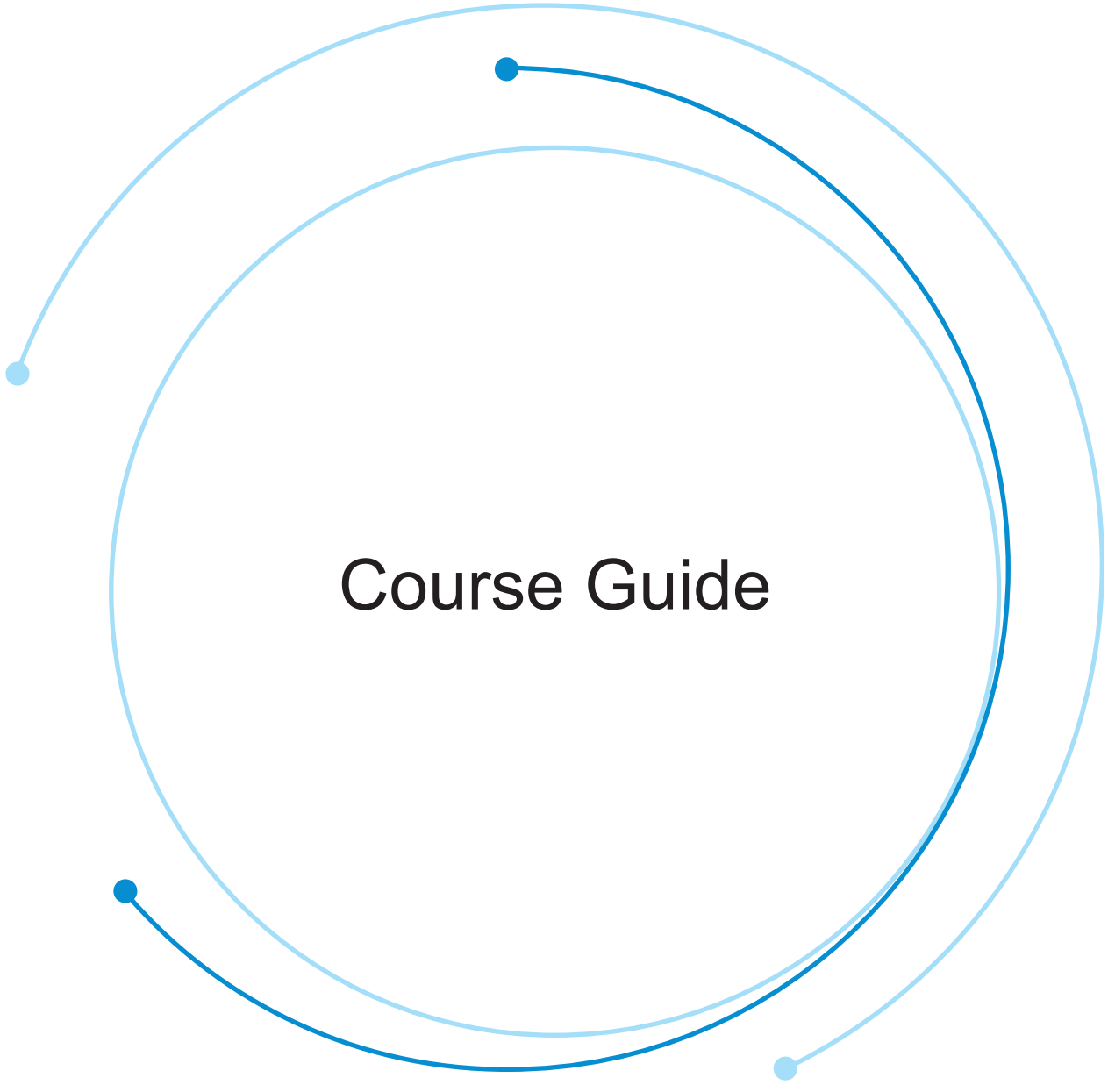
# ELEC S212

## Network Programming and Design



Course Guide

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This course material is printed on environmentally friendly paper.

# Contents

# Introduction

*ELEC S212 Network Programming and Design* is a ten-credit, middle-level course on computer networking that leads towards the core elements of the BSc/BSc(Hons) in Communications Technology and the BSc(Hons) in Communications Technology with Management. It is also suitable for those of you who would simply like to acquire knowledge about networking technology.

The course comprises ten units covering networking principles, network design and network programming, with its primary focus on the Internet. The contents are tailor-made for students in Hong Kong by keeping the local environment in perspective by interspersing a series of local case studies throughout the study units.

*ELEC S212* aims to introduce you to the fundamental principles and techniques of network design and programming. It also covers a range of contemporary topics with relevance including wireless/mobile technologies, network game programming and network security. The course will equip you with practical knowledge that both lays the groundwork for your study of higher-level IT courses at OUHK (especially those relevant to networking) and contains useful information that can be applied to your work. Not only will you study concepts, principles and techniques, you will also be given the opportunity to put them into practice through custom-built online labs.

There are no prerequisites for this course, although you should be proficient in using personal computers and accessing the Internet.

# What this course helps you do

It is important that you know about what *ELEC S212* is going to teach and what you will be capable of doing after completing it. You should therefore read this section carefully in order to better align your expectations, and get yourself prepared to get the most from the course so that you can use it to your advantage.

## Aims

*ELEC S212* aims to:

1 *Introduce* you to the architectural models, operating principles and other technologies related to computer networks.

2 *Introduce* you to the Internet's historical development, international collaboration and applications.

3 *Introduce* you to contemporary networking topics including mobile/wireless technologies, network security, network games and Next Generation Networks (NGNs).

4 *Delineate* the principles, approaches and techniques of network design, and *help* you apply them in practice.

5 *Develop* your ability to draw up and evaluate network designs for different situations.

6 *Equip* you with basic skills in network programming.

7 *Develop* your ability to design and develop network and Internet applications.

## Course learning outcomes

At the end of the course, you should be able to:

1 *Explain* the principles of networking and internetworking.

2 *Describe* network industry standards and common network protocols.

3 *Design* and *program* network applications for a variety of purposes.

4 *Develop* programs that access the Web services via their application programming interface.

5 *Discuss* the principles and advantages of resource sharing on computer networks.

6 *Design* small local area networks based on requirements.

7 *Analyse* network security issues and *explain* network security solutions and protocols.

# Working through this course

The following introduces the materials required for completing this course and the information on the assignments and their marking. After going through them, you will be ready to set off on a journey into the realms of network design and programming!

## Materials

In addition to this *Course Guide*, the course has the following important components.

### Study units

1 Introduction to computer networking and the Internet

2 Network infrastructure

3 The essentials of TCP/IP

4 Network operating systems

5 Introduction to network application development

6 Network programming

7 Internet applications development

8 Security in networks

9 Wide area network access and wireless technologies

10 Network solution design and network marketing

### Set textbooks

Two textbooks, which supplement each other, will be required in the course:

Dean, T (2012) *Network+ Guide to Networks*, 6th edn, Thomson Course Technology.

Tsang, P, Kwok, P, Mak, J and Wu J (2009) *Internet and Communications Technology Lab Book*, Open University of Hong Kong Press.

### Audiovisual materials/software

To assist you in your studies, a number of multimedia elements are deployed in this course, such as graphic illustrations, multimedia animations and voice-over-presentations. In addition, a range of online labs has been developed and incorporated into the *ELEC S212* study units to allow you to practise and reinforce what you have learned.

### Assignment File

Assignment details for this course are contained in your *Assignment File*. The nature of these assignments is described in the Assessment section below. You are required to complete your assignments and submit them electronically through the Online Learning Environment (OLE) in accordance with the timetable provided in the *Presentation Schedule* below.

### Presentation Schedule

The *Presentation Schedule* for this course is available on the OLE. On this schedule, you will see the approximate time for completing assignments, attending tutorials and surgeries, and so on. Please note that your must submit all your assignments in time to reach your tutor by the dates shown in the *Assignment File*.

## Assessment

### Assignments

There are four assessment exercises (assignments) for the course.

The assignments will examine your understanding of the topics covered in the course, your ability to apply what you have learned to analyse and solve problems, and your motivation to explore relevant technological developments.

The assignments will be worth 50% of your overall course score for *ELEC S212*. Your best three assignments will count toward the overall continuous assignment score. The weighting of each assignment is shown in the 'Course marking scheme' section below.

### Final examination and grading

The final examination for *ELEC S212* is 'closed book' and is three hours long. The examination is worth 50% of your total course mark.

## Course marking scheme

The following table summarizes the assessment breakdown.

| **Type of assessment** | **Marks (percentage)** |
|---|---|
| *Assignments (the best three will be counted towards the total)*<br>Assignment 1 (16.7%)<br>Assignment 2 (16.7%)<br>Assignment 3 (16.7%)<br>Assignment 4 (16.7%) | 50% |
| *Examination* | 50% |
| **Total** | **100%** |

# Course overview

| Unit | Title | Weeks | Assessment |
|---|---|---|---|
| 1 | Introduction to computer networking and the Internet | 3 | |
| 2 | Network infrastructure | 4 | |
| 3 | The essentials of TCP/IP | 4 | |
| 4 | Network operating systems | 3 | Assignment 1 |
| 5 | Introduction to network application development | 3 | |
| 6 | Network programming | 4 | Assignment 2 |
| 7 | Internet applications development | 4 | |
| 8 | Security in networks | 4 | Assignment 3 |
| 9 | Wide area network access and wireless technologies | 3 | |
| 10 | Network solution design and network marketing | 4 | Assignment 4 |
| | Total | 36 | |

# How to get the most from this course

*ELEC S212 Network Programming and Design* covers a wide range of materials. To understand all of them, you should follow these study steps:

1 Read the objectives of each study unit.

2 Read the study unit.

3 Read the appropriate sections from your textbook.

4 Read the optional readings in the unit.

5 Summarize the key issues you have read.

6 Do the self-test exercises and perform the activities.

7 Perform the unit's online labs, if any.

8 Find and ask open questions for discussion, both in the tutorials and on the online discussion forum.

9 Check the unit's objectives and make sure that you have completed everything that you need to do to achieve these learning objectives.

10 Complete the assignments.

It is very important that you complete the self-test exercises, activities, online lab and assignments successfully and on time. If you have difficulty completing a section of a unit, go back and review the readings for that section before you go on to the next section. If you still have problems, please contact your tutor.

## Tutors and tutorials

There are nine two-hour face-to-face tutorials, and 12 two-hour surgeries designed to help you in this course. Although these tutorials and surgeries are not compulsory, you are strongly encouraged to attend them.

Your tutor will mark and comment on your assignments, keep a close watch on your progress and on any difficulties you might encounter, and will try to help you during the course. As mentioned in *Assignment File* section, your assignments should be submitted through the OLE to your tutor before the due date. Your tutor will mark them and return them to you as soon as possible.

Do not hesitate to contact your tutor by telephone, email, or posting questions in your group's discussion board if you need help! For example, contact your tutor if:

- you do not understand any part of the study units or the assigned readings;
- you have any difficulty with the self-tests and the course activities; or
- you have a question about or problem with the assignments, with your tutor's comments or the grading of an assignment.

You will be notified of the dates, times and location of the tutorials, together with the name and phone number of your tutor, as soon as you are allocated a tutorial group.

# Summary

*ELEC S212 Network Programming and Design* introduces you to network programming and design techniques. Topics related to the Internet, including its underlying mechanisms, the services available and programming for it, are also discussed. Theoretical concepts and practical techniques are integrated with the practical analysis of case study design and programming problems.

In order to understand the content of this course, you must analyse the course materials and apply the concepts learned. We hope you will find *ELEC S212 Network Programming and Design* both interesting and enjoyable, and be able to apply the knowledge and skills from this course throughout your career.

Good luck and we hope that you will achieve great success and satisfaction from this course.

# A note about the developers of this course

## Mr John N K WU

Mr Wu received his MSc degree in Computer Science and BEng degree in Information Engineering from the Chinese University of Hong Kong. He has been working in the IT field for almost 15 years, specializing in networking and application development, and has earned a number of professional certifications in the areas of computer networking, IT security, Linux, etc. Currently, his work focuses on network infrastructure support, mobile/wireless applications and IT security. He is also serving as a part-time tutor at the OUHK.

## Mr Jacky MAK

Mr Mak received his BSc degree (First Class Honours) in Applied Computing from the Open University of Hong Kong (OUHK). He has worked intensively on website development, infrastructure design, and systems and network administration since 1996. Currently, he is working for Hong Kong Cable Television Limited, overseeing a number of Web, application, database and video streaming systems. He is also a part-time tutor at the OUHK. Mr Mak is studying for an MSc degree in Computer Science at the Chinese University of Hong Kong, and he holds professional certifications from Microsoft, Sun Microsystems and the Linux Professional Institute.