



**London  
South Bank  
University**

EST 1892

# Module Guide

Network Technologies and Design

ENG\_6\_537

School of Engineering

Level 6

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## 1. MODULE DETAILS

<b>Module Title:</b>	Network Technologies and Design
<b>Module Level:</b>	6
<b>Module Reference Number:</b>	ENG_6_537
<b>Credit Value:</b>	20
<b>Student Study Hours:</b>	200
<b>Contact Hours:</b>	78 hours Teaching/Tutorial/Workshops
<b>Private Study Hours:</b>	122
<b>Pre-requisite Learning (If applicable):</b>	Introduction to Communication Systems and Networks
<b>Co-requisite Modules (If applicable):</b>	None
<b>Course(s):</b>	M/BEng CSN
<b>Year and Semester</b>	Semester 1, 2017/18
<b>Module Coordinator:</b>	Dr Zhanfang Zhao
<b>MC Contact Details (Tel, Email, Room)</b>	Room T814, Tel: 02078156340 Email: zhaoza@lsbu.ac.uk
<b>Teaching Team &amp; Contact Details (If applicable):</b>	Zhanfang Zhao
<b>Subject Area:</b>	Electrical & Electronic Engineering
<b>Summary of Assessment Method:</b>	Exam + Course Work
<b>External Examiner appointed for module:</b>	Des McLernon

## 2. SHORT DESCRIPTION

This module will provide students with a broad understanding of the enterprise network technologies and teach students how to design enterprise networks.

## 3. AIMS OF THE MODULE

The aims of the module are:

- To understand the purpose of access technologies and the associated physical concepts
- To understand the concepts of data networking from the point of view of:
  - o Mobility
  - o Reliability
  - o Addressing
  - o Standardisation
  - o Internetworking
- To understand the need to maintain and update technical knowledge using professional bodies like the IEEE.
- To provide a broad understand of network technologies.
- To provide knowledge and skills for enterprise network design.

## 4. LEARNING OUTCOMES

### 4.1 Knowledge and Understanding

- Understand the concept of computer networks and network technologies.
- Understand the basic details of application, transport, network, data link and physical layers of modern computer networks and Internet.
- Be able to design networks using start of art network technologies.

### 4.2 Intellectual Skills

- Distinguish between open and closed standards and how they contribute to the evolution of the market.
- Understand analysis of complexity in terms of interfaces defined by services offered between hierarchies of layers. For example the network layer will offer an end-to-end delivery service to the transport layer.
- Be able to abstract the service in terms of protocol definition.

### 4.3 Practical Skills

- Network simulation and design.
- Router and Switch Configurations.
- Socket programming in C/C++/Java.

### 4.4 Transferable Skills

- Manage a design project
- Maintain a logbook of experimental work
- Use the proprietary software design tools
- Write formal reports representing the engineering design process

## 5. ASSESSMENT OF THE MODULE

Exam (2 hrs)	70%
Course work based on group projects	30%

Labs on every week, and students hand in a formal report on week 13, **Fri Jan 12, 2018.**

## 6. FEEDBACK

Feedback will normally be given to students 15 working days after the final submission of an assignment or as advised by their module leader.

General feedback, applying to all students, will also be placed on the module VLE site within 15 working days.

## 7. INTRODUCTION TO STUDYING THE MODULE

### 7.1 Overview of the Main Content

1. Introduction to Network Technologies
2. Router and Switching Technologies
3. Network Design
4. Workshops

### 7.2 Overview of Types of Classes

**Lectures/Tutorials (39 hours)**

During lectures a short presentation will be given to students as an introduction to each of the topics. The lectures will cover concepts of the network technologies with pointers for further study.

### **Workshops (39 hours)**

The workshops will provide a series of practical laboratory sessions in the form of small group projects on the topics of the syllabus. Every student will be expected to keep a logbook for the lab where these tasks will be documented.

Students will be required to submit a formal assignment documenting the work of laboratory sessions.

### **Independent study (122 hours)**

As in every module, students are expected to carry out 122 hours of independent study throughout the duration of the module. This time should be used to complete the workshop exercises if necessary and also to tackle the three assignments designed for this module.

## **7.3 Importance of Student Self-Managed Learning Time**

Student responsibility in the learning and development process will be emphasised.

Students are required to undertake directed self-study and prepare solutions/discussions to questions relative to various topic areas. Students will be encouraged to identify for themselves particular problems of difficulty and to use seminar discussions, where appropriate, for the resolution of these. Students must regularly access the Moodle site for this module. They should download the class/lecture material from the Moodle site, and do the recommended reading, before each lecture/class.

Where appropriate, students are also expected to download the relevant seminar questions and study them in advance of each seminar, in order to derive maximum benefit from seminar time. The programme of teaching, learning and assessment gives guidance on the textbook reading required for each week, the purpose of which is to encourage further reading both on and around the topic.

## **7.4 Employability**

Internet and computer networks are the largest engineered system ever created by mankind with hundreds of millions of connected computers, communication links, and users. A thorough understanding of the fundamental principles of computer networking, Internet and layered structure of telecommunication systems together with analytical skills studied in this course are useful developments for enhancement of employability.

# **8. THE PROGRAMME OF TEACHING, LEARNING AND ASSESSMENT**

SEMESTER 2		
WEEK	TOPIC	READING (CORE TEXT)
1	Introduction to network technologies -What is internet? -Network edge, access networks and physical media -Network core -Delay, loss and throughput in packet-switched networks	1,2,3
2	TCP/IP & OSI models -Application Layer -Transport Layer -Internet Layer -Link Layer  Application Layer Protocols	1,2,3

3	Transport Layer	1
4	Network Layer  Routing and Switching Technologies -Routing technologies and router configurations -Switching technologies and switch configurations	1,2,3
5	Link Layer and LANs	1
6	Wireless and Mobile Networks	1,2,3
7	Multimedia Networking	1,2,3
8	Network Security and Encryption	1,2,3
9	Network Management	1,2,3,4
10	Network design -Identifying the needs and goals, characterising the existing networks. -Logical Network Design, addressing, naming, switching and routing protocols, network security and network management. -Physical Network Design, technologies and devices, testing, optimizing, and documenting network design.	1,2,3,4
11	Advanced Networking Topics	1,2,3,4
12	Revision	1,2,3,4

## 9. STUDENT EVALUATION

N.A.

## 10. LEARNING RESOURCES

### Reading List

#### 10.1 Core Materials

1. James F. Kurose and Keith W. Ross, "Computer Networking, A top-down approach: International version", 6th edition, Pearson Higher Education, 2012.
2. K D Stewart III, A Adams, "Designing and Supporting Computer Networks", Cisco Press, 2008.
3. Cisco Academy, <https://www.netacad.com/>
4. GNS3, <https://www.gns3.com/>

#### 10.2 Optional Materials

5. Alasdair Gilchrist, Industry 4.0 - The Industrial Internet of Things, Springer, 2016.

6. Adrian McEwen (Author), Hakin Cassimally, Designing The Internet of Things, Wiley, 2015
7. Priscilla Oppenheimer, "Top-Down Network Design", 3rd Edition, Cisco Press, 2010.
8. A Reid, J Lorenz, C Schmidt, "Introducing Routing and Switching in the Enterprise", Cisco Press, 2008.
9. Behrouz A. Forouzan, "Data Communications and Networking", 4th edition, McGraw-Hill, 2007.
10. Alberto Leon-Garcia and Indra Widjaja, "Communication Networks", 2nd edition, McGraw-Hill, 2003. Practical Industrial Data Networks: Design, Installation and Troubleshooting (IDC Technology), Steve Mackay (Author), Edwin Wright (Author), Deon Reynders (Author), John Park (Author) , ISBN: 075065807X
11. Kevin R. Fall, W. Richard Stevens, TCP/IP Illustrated, Volume 1: The Protocols, Addison-Wesley, 8 Nov 2011.