# Course Specification

## (Bachelor)

| | |
|---|---|
| **Course Title**: | Computer Networks |
| **Course Code**: | **CIT1202** |
| **Program**: | **Bachelor in Information Technology** |
| **Department**: | **Information Technology** |
| **College**: | **Faculty of Computer and Information Technology** |
| **Institution**: | **University of Tabuk** |
| **Version**: | **1.0** |
| **Last Revision Date**: | **27 July 2022** |

# Table of Contents

## A. General information about the course:

### 1. Course Identification

| 1. Credit hours: |
|---|
| 3 CHrs. (Three-Credit Hours) |

**2. Course type**

| A. | ☐University | ☐College | ☒ Department | ☐Track | ☐Others |
|---|---|---|---|---|---|
| B. | ☒ Required | | | ☐Elective | |

**3. Level/year at which this course is offered: Level 4/2nd Year**

**4. Course general Description:**

This course provides a comprehensive introduction to computer networks with focus on the functions performed at each layer of the network architecture and common layer protocol standards. Topics covered include: introduction to computer networks and layered architectures: connectivity, topology, circuit and packet switching, TCP/IP and ISO models; Application layer: standard Client-Server protocols: DNS, SMTP, FTP, HTTP, network management protocols, multimedia streaming, Peer-to-Peer Paradigm; Transport layer: TCP and UDP, error control, congestion and flow control; Network layer: Internetworking, addressing and routing algorithms and protocols; Data link layer: Framing, medium access control.

**5. Pre-requirements for this course (if any):**

Computer Organization and Assembly Programming (CSC 1202)

**6. Co-requisites for this course (if any):**

NA

**7. Course Main Objective(s):**

- ▪ **Build an understanding of the fundamental concepts of computer networking.**
- ▪ **Familiarize the student with the basic taxonomy and terminology of computer networks,**
- ▪ **Develop a solid conceptual understanding of the essentials and design issues underlying a wide spectrum of modern computer network technologies with focus on the Internet model.**
- ▪ **Provide students with an opportunity to gain practical insights and hands-on experience on using networking hardware, software and tools.**

### 2. Teaching mode (mark all that apply)

| No | Mode of Instruction | Contact Hours | Percentage |
|---|---|---|---|
| 1 | Traditional classroom | 60 | 100% |

## 3. Contact Hours (based on the academic semester)

| No | Activity | Contact Hours |
|---|---|---|
| 1. | **Lectures** | 30 |
| 2. | **Laboratory/Studio** | 30 |
| 3. | **Field** | 0 |
| 4. | **Tutorial** | 0 |
| 5. | **Others (specify)** | 0 |
| **Total** | | 60 |

## B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

| Code | Course Learning Outcomes | Code of PLOs aligned with program | Teaching Strategies | Assessment Methods |
|---|---|---|---|---|
| **1.0** | **Knowledge and understanding** | | | |
| 1.1 | **Describe how computer networks are organized with the concept of layered approach.** | K2 | **Lectures, textbooks, handouts, references..** | **Exams, quizzes, assignments.** |
| 1.2 | **Define and explain the different types and characteristics of a Computer Network** | K2 | **Lectures, textbooks, handouts, references..** | **Exams, quizzes, assignments.** |
| 1.3 | **Distinguish between OSI and TCP/IP models** | K3 | **Lectures, textbooks, handouts, references..** | **Exams, quizzes, assignments.** |
| 1.4 | **Create network addressing schemes using subnetting** | K3 | **Lectures, textbooks,** | **Exams, quizzes, assignments.** |

| Code | Course Learning Outcomes | Code of PLOs aligned with program | Teaching Strategies | Assessment Methods |
|------|--------------------------|-----------------------------------|---------------------|---------------------|
| | | | handouts, references. . | |
| 1.5 | Explain network fundamentals and technologies | K3 | Lectures, textbooks, handouts, references. . | Exams, quizzes, assignments. |
| **2.0** | **Skills** | | | |
| 2.1 | Design and implement computer networks with routers and switches. | S2, S4 | Lectures, textbooks, handouts, references | Exams, quizzes, assignments |
| 2.2 | Design logical sub-address blocks with a given address block. | S2, S4 | Lectures, textbooks, handouts, references | Exams, quizzes, assignments |
| **3.0** | **Values, autonomy, and responsibility** | | | |
| | | | | |

## C. Course Content

| No | List of Topics | Contact Hours |
|----|----------------|---------------|
| 1. | **Introduction to computer networks** <br> **Lab: Introducing the Wireshark packet sniffing tool** | **4** |
| 2. | **Layered architectures: ISO and Internet models** <br> **Lab: Introducing Ping program** | **4** |
| 3. | **Application layer overview** <br> **Lab: Introducing Traceroute and DNS Lookup tools** | **4** |
| 4. | **Standard Client-Server Protocols: Telnet, HTTP** <br> **Lab: Investigating various aspects of the HTTP protocol: the basic GET/response communication, HTTP message formats, requesting large HTML files, retrieving HTML files that have embedded objects, and HTTP security and authentication** | **4** |
| 5. | **SMTP, DNS, FTP** <br> **Lab: Exploring the client side of DNS using Wireshark** | **4** |
| 6. | **Network Management Protocols: SNMP, Peer-to-Peer Paradigm** | **4** |

| No. | | Hours |
|-----|---|-------|
| 7. | Multimedia: streaming stored audio/video, multimedia applications, compression and quality of service | 4 |
| 8. | Transport Layer: Overview & process to process delivery, UDP<br>Lab: Exploring the UDP transport protocol using Wireshark | 4 |
| 9. | TCP and Congestion control, Error and flow control<br>Lab: Exploring the TCP transport protocol using Wireshark | 4 |
| 10. | Network Layer: Internetworking, Addressing and Routing, NAT<br>Lab: Investigate the behavior of the NAT protocol using Wireshark | 4 |
| 11. | Network layer protocols: IP, Unicast and multicast routing<br>Lab: Investigating the IP protocol using Wireshark, focusing on the IP datagram, and analyzing a trace of IP datagrams sent and received by an execution of the Traceroute program, exploring the fields in the IP datagram, and studying IP fragmentation in detail. | 4 |
| 12. | Network layer protocols: ICMP<br>Lab: Capturing the ICMP packets generated by the Ping program and analyzing them using Wireshark | 4 |
| 13. | Data link layer: Framing, medium access control, ARP, configure switches and routers<br>Lab: Investigating the Ethernet protocol and the ARP protocol using Wireshark | 4 |
| 14. | Setup and configure LAN, WLAN, WAN, and VLAN<br>Lab: Investigating the 802.11 wireless network protocol using Wireshark | 4 |
| 15. | Setup various servers such as DNS, DHCP<br>Lab: Investigating the DHCP protocol using Wireshark that is used extensively in organization, university, and home-network wired and wireless LANs to dynamically assign IP addresses to hosts | 4 |
| **Total** | | **60** |

## D. Students Assessment Activities

| No | Assessment Activities * | Assessment timing (in week no) | Percentage of Total Assessment Score |
|-----|-------------------------|--------------------------------|--------------------------------------|
| 1. | Quizzes | 3,13 | 10 |
| 2. | Mid-term 1 | 5 or 6 | 20 |
| 3. | Mid-term 2 | 10 or 11 | 20 |
| 4. | Assignments | 15 | 10 |
| 5. | Final Exam | 16 or 17 | 40 |

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

## E. Learning Resources and Facilities

### 1. References and Learning Resources

| | |
|---|---|
| **Essential References** | ▪ **Data Communications and Networking, Behrouz A. Forouzan, McGraw-Hill Higher Education, ISBN: 0072967757** <br> ▪ **Cisco Networking Academy Program CCNA 1 and 2 Lab Companion, Cisco Systems Inc., Cisco Press, ISBN: 1-58713-149-8** |
| **Supportive References** | ▪ **Computer Communications and Networking Technologies, M. A. Gallo and W. M. Hancock, Brooks/Cole, ISBN: 0-534-37780-7.** <br> ▪ **Data and Computer Communications, W Stallings, Prentice Hall, ISBN: 0-02-415425-3** <br> ▪ **Computer Networking: A Top-Down Approach, Kurose, J. F., and K. W. Ross. Eight Edition. Harlow. (2021), ISBN: 978-1292405469.** |
| **Electronic Materials** | |
| **Other Learning Materials** | |

### 2. Required Facilities and equipment

| Items | Resources |
|---|---|
| **facilities** <br> (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.) | **Classroom, laboratories** |
| **Technology equipment** <br> (projector, smart board, software) | **Data show** |
| **Other equipment** <br> (depending on the nature of the specialty) | |

## F. Assessment of Course Quality

| Assessment Areas/Issues | Assessor | Assessment Methods |
|---|---|---|
| Course Assessment Survey conducted | Quality Assurance Committee | Indirect |
| CLO Assessment Survey | Instructor | Indirect |
| Direct Outcomes Assessment | Quality Assurance Committee | Direct |
| Teaching Assessment Survey | Quality Assurance Committee | Indirect |
| Course report | Quality Assurance Committee | Indirect |

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

## G. Specification Approval

| COUNCIL /COMMITTEE | |
|---|---|
| REFERENCE NO. | |
| DATE | |