# Course Specifications

| | |
|---|---|
| **Course Title:** | **Computer Networks** |
| **Course Code:** | **ICS 314** |
| **Program:** | **Computer Science and Information Program** |
| **Department:** | **Department of Computer Science and Information** |
| **College:** | **College of Science at Azzulfi** |
| **Institution:** | **Majmaah University** |

## Table of Contents

## A. Course Identification

| |
|---|
| **1. Credit hours: 3** |
| **2. Course type** <br> **a.**      University ☐    College ☐    Department ☐      Others ☐ <br> **b.**        Required ☐      Elective ☐ |
| **3. Level/year at which this course is offered: 4** |
| **4. Pre-requisites for this course** (if any)**:** <br>    ICS  222 |
| **5. Co-requisites for this course** (if any)**:** |

### 6. Mode of Instruction (mark all that apply)

| No | Mode of Instruction | Contact Hours | Percentage |
|---|---|---|---|
| 1 | **Traditional classroom** | | |
| 2 | **Blended** | | |
| 3 | **E-learning** | | |
| 4 | **Correspondence** | | |
| 5 | **Other** | | |

### 7. Actual Learning Hours (based on academic semester)

| No | Activity | Learning Hours |
|---|---|---|
| **Contact Hours** | | |
| 1 | **Lecture** | |
| 2 | **Laboratory/Studio** | |
| 3 | **Tutorial** | |
| 4 | **Others** (specify) | |
| | **Total** | |
| **Other Learning Hours*** | | |
| 1 | **Study** | |
| 2 | **Assignments** | |
| 3 | **Library** | |
| 4 | **Projects/Research Essays/Theses** | |
| 5 | **Others**(specify) | |
| | **Total** | |

**\***The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times

## B. Course Objectives and Learning Outcomes

**1. Course Description**

The goal of this course is to introduce computer networks, and discuss the three main aspects of networking i.e. architecture, algorithms, and implementation with focus on performance.

It examines techniques for transmitting information efficiently and reliably over a variety of communication media.

It looks at the addressing and routing problems that must be solved to ensure that transmitted data gets to the desired destination.

Students come to understand the impact that the distributed nature of all network problems has on their difficulty. The course examines the ways in which these issues are addressed by current networking protocols such as TCP/IP and Ethernet

**2. Course Main Objective**

- Describe major computer networks components.
- Be familiar with various types of computer networks
- Describe how Internet works.
- Understand the OSI and Internet layers.
- Understand protocols and routing algorithms.
- Knowing the various aspects about computer networks security

**3. Course Learning Outcomes**

| | CLOs | Aligned PLOs |
|---|---|---|
| 1 | **Knowledge:** | |
| 1.1 | Understand basic computer network technology protocols. | |
| 1.2 | Understand and explain Data Communications System and its components. | |
| 1.3 | Identify the different types of network topologies and protocols. | |
| 1.4 | Identify the layered structure of a typical networked architecture. | |
| 1.5 | Understand the organization of the network layers. | |
| 1.6 | Understand how resources can be allocated in a network. | |
| 1.7 | Understand how packets are forwarded in an IP network. | |
| 1.8 | Understand how frames are forwarded in an Ethernet network | |
| 1.9 | Understand the key security issues of computer communication | |
| 2 | **Skills :** | |
| 2.1 | Be able to explain the most important standards in the field of computer communication | |
| 2.2 | Assess different solutions for computer networks | |
| 3 | **Competence:** | |
| 3.1 | Give an oral presentation of problems and technical solutions in the field of computer networks | |
| 3.2 | Explain the historical development of the field of computer communication | |

## C. Course Content

| No | List of Topics | Contact Hours |
|---|---|---|
| 1 | **Introduction to Computer Networks** | 6 |

| | | | |
|---|---|---|---|
| | - Organization of the Internet (Internet Service Providers, Content Providers, etc.)<br>- Switching techniques (e.g., circuit, packet)<br>- Physical pieces of a network, including hosts, routers, switches, ISPs, wireless, LAN, access point, and firewalls | | |
| 2 | **Networked Applications**<br><br>- Naming and address schemes<br>- Distributed applications<br>- HTTP as an application layer protocol<br>- Multiplexing with TCP and UDP<br>- Socket APIs | 6 | |
| 3 | **Reliable Data Delivery**<br><br>- Error control (retransmission techniques, timers)<br>- Flow control (acknowledgements, sliding window)<br>- Performance issues (pipelining)<br>- TCP | 9 | |
| 4 | **Routing and Forwarding**<br><br>- Routing versus forwarding<br>- Static routing<br>- Internet Protocol (IP)<br>- Scalability issues (hierarchical addressing) | 9 | |
| 5 | **Local Area Networks**<br><br>- Multiple Access Problem<br>- Local Area Networks<br>- Ethernet<br>- Switching | 6 | |
| 6 | **Resource Allocation**<br><br>- Need for resource allocation<br>- Fixed allocation (TDM, FDM, WDM) versus dynamic allocation<br>- End-to-end versus network assisted approaches<br>- Fairness<br>- Principles of congestion control<br>- Approaches to Congestion (e.g., Content Distribution Networks) | 9 | |
| **Total** | | | |

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

| Code | Course Learning Outcomes | Teaching Strategies | Assessment Methods |
|---|---|---|---|
| **1.0** | **Knowledge** | | |
| 1.1 | Understand basic computer network technology protocols. | Lectures<br><br>Lab demonstrations<br><br>Case studies<br><br>Individual presentations | Written Exam<br><br>Homework assignments<br><br>Class Activities<br><br>Quizzes |
| 1.2 | Understand and explain Data Communications System and its components. | | |
| 1.3 | Identify the different types of network topologies and protocols. | | |
| 1.4 | Identify the layered structure of a typical networked architecture. | | |
| 1.5 | Understand the organization of the network layers. | | |
| 1.6 | Understand how resources can be allocated in a network. | | |
| 1.7 | Understand how packets are forwarded in an IP network. | | |
| 1.8 | Understand how frames are forwarded in an Ethernet network | | |
| 1.9 | Understand the key security issues of computer communication | | |
| **2.0** | **Skills** | | |
| 2.1 | Be able to explain the most important standards in the field of computer communication | Small group discussions.<br><br>Whole group discussions.<br><br>Brainstorming.<br><br>Presentations. | Written Exam<br><br>Homework assignments<br><br>Class Activities<br><br>Quizzes |
| 2.2 | Assess different solutions for computer networks | | |
| **3.0** | **Competence** | | |
| 3.1 | Give an oral presentation of problems and technical solutions in the field of computer networks | Small group discussions.<br><br>Whole group discussions.<br><br>Brainstorming.<br><br>Presentations. | Written Exam<br><br>Homework assignments<br><br>Class Activities<br><br>Quizzes |
| 3.2 | Explain the historical development of the field of computer communication | | |

## 2. Assessment Tasks for Students

| # | Assessment task* | Week Due | Percentage of Total Assessment Score |
|---|---|---|---|
| 1 | First written mid-term exam | 6 | 20% |
| 2 | Second written mid-term exam | 12 | 20% |
| 3 | Presentation, class activities, lab activity, and group discussion | Every week | 10% |
| 4 | Homework assignments | After every chapter | 10% |
| 5 | Final written exam | 15 | 40% |
| | **TOTAL** | | 100% |

*Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

# E. Student Academic Counseling and Support

**Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :**

**1**. A total of 6 office hours per week in the lecturer schedule in order to facilitate the student.
**2**. Contacting students using e-mail , mobile, office telephone and website.

# F. Learning Resources and Facilities

## 1.Learning Resources

| | |
|---|---|
| **Required Textbooks** | Computer Networks and Internets, Global Edition, 6/E, Douglas Comer, Pearson, 2016. Computer Networking Problems and Solutions: An innovative approach to building resilient, modern networks, Russ White and Ethan Banks, Addison-Wesley, 2018 |
| **Essential References Materials** | Data and Computer Communication 9th Ed., William Stallings. Pearson Prentice Hall, 2011 |
| **Electronic Materials** | https://www.coursera.org |
| **Other Learning Materials** | Video and presentations that are available with the instructor |

## 2. Facilities Required

| Item | Resources |
|---|---|
| **Accommodation** (Classrooms, laboratories, demonstration rooms/labs, etc.) | Classrooms and, Library, as those are available at the college of science at Azzulfi |
| **Technology Resources** (AV, data show, Smart Board, software, etc.) | Smart Board |
| **Other Resources** (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list) | None |

# G. Course Quality Evaluation

| Evaluation Areas/Issues | Evaluators | Evaluation Methods |
|---|---|---|
| Effectiveness of Teaching | Students | • Analysis of students' results. Observation during class work.<br>• Students' evaluations.<br>• Colleagues' evaluations.<br>• Evaluation questionnaire filled by the students.<br>• Interview a sample of students enrolled in the course to take their opinions |
| Evaluation of Teaching | Program leaders | • Self-assessment.<br>• External evaluation.<br>• Periodic review of course (the Commission of study plans) |

**Evaluation areas** (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes,Quality oflearning resources, etc.)
**Evaluators** (Students,Faculty, Program Leaders,Peer Reviewer, Others (specify)
**Assessment Methods**(Direct, Indirect)

# H. Specification Approval Data

| | |
|---|---|
| **Council / Committee** | |
| **Reference No.** | |
| **Date** | |