



## 39. Course Specification for Communications Networks I

| <b>I. Course Identification and General Information:</b> |  |   |     |     |     |       |
|--|--|---|-----|-----|-----|-------|
| 1.   | Course Title:  | Communications Networks I                     |     |     |     |       |
| 2.   | Course Code & Number:                                  | CNE342  |     |     |     |       |
| 3.   | Credit hours:  | C.H   |     |     |     | Total |
|  |  | Th.   | Tu. | Pr. | Tr. |       |
|  |  | 2   | 2   | 2   | -   | 4     |
| 4.   | Study level/ semester at which this course is offered: | 4 <sup>th</sup> Leve/1 <sup>st</sup> Semester |     |     |     |       |
| 5.   | Pre –requisite (if any):                               | Communication Principles (CNE221)             |     |     |     |       |
| 6.   | Co –requisite (if any):                                | None.   |     |     |     |       |
| 7.   | Program (s) in which the course is offered:            | Communication Engineering and Networks        |     |     |     |       |
| 8.   | Language of teaching the course:                       | English                                       |     |     |     |       |
| 9.   | Location of teaching the course:                       | Class Room + Lab                              |     |     |     |       |
| 10.  | Prepared By:   | Associate Prof. Dr. Ali Mnea Alsih            |     |     |     |       |
| 11.  | Date of Approval                                       |   |     |     |     |       |

| <b>II. Course Description:</b>  |
|---|
| <p>This course is intended to give students an understanding of the basic concepts and technical aspects of data communications &amp; Networking. Topics to be covered include overview of data communication systems, Network Topologies, layered network architectures for OSI and TCP/IP models, Transmission media, Switching, Internetworking, Ethernet, Connecting devices, Wan networks, IP Addresses.</p> |

Head of  
 Department  
 Asst. Prof. Dr.  
 Adel Ahmed Al-  
 Shakiri

Quality Assurance  
 Unit  
 Assoc. Prof. Dr.  
 Mohammad Algorafi

Dean of the Faculty  
 Prof. Dr. Mohammed  
 AL-Bukhaiti

Academic  
 Development  
 Center & Quality  
 Assurance  
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 Huda Al-Emad

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| III. Course Intended learning outcomes (CILOs) of the course |  | Referenced PILOs |
|--|--|------------------|
| a1   | Describe the different components of communication systems and their functions, the different network elements and topologies, the different types of networks and their applications and specifications, the importance and functions of layers in TCP/IP and OSI reference models. | A1               |
| a2   | Demonstrate knowledge of IP addressing, and internetworking concepts, architecture and protocols.  | A2               |
| b1   | Analyze electrical and communication systems and processes using appropriate modeling techniques.  | B3               |
| b2   | Interpret data related to communications networks.   | B2               |
| c1   | Configure active components such as switches and routers and set basic network parameters.   | C2               |
| c2   | Perform network troubleshooting and use network diagnostic tools.  | C4               |
| d1   | Work effectively with minimum supervision, both individually and as a part of a team.  | D1               |
| d2   | Continue improving his/her professional skills.  | D2               |

| (A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies: |   |  |
|--|---|--|
| Course Intended Learning Outcomes  | Teaching strategies   | Assessment Strategies  |
| a1- Demonstrate knowledge of IP addressing, and internetworking concepts, architecture and protocols.                            | <ul style="list-style-type: none"> <li>▪ Lectures</li> <li>▪ Simulation Programs</li> <li>▪ presentations</li> <li>▪ Lab</li> </ul> | <ul style="list-style-type: none"> <li>▪ Written Exam</li> <li>▪ Projects</li> </ul> |

Head of Department  
 Asst. Prof. Dr. Adel Ahmed Al-Shakiri

Quality Assurance Unit  
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|   |  |  |
|---|--|--|
| <p><b>a2-</b> Explain the different types of switching techniques and recognize the application areas of VLANs, demonstrate knowledge and understanding of IP addressing, and recognize internetworking concepts, architecture and protocols.</p> | <ul style="list-style-type: none"> <li>▪ Lectures</li> <li>▪ Simulation Programs</li> <li>▪ presentations</li> <li>▪ Lab</li> <li>▪ Problem solving</li> </ul> | <ul style="list-style-type: none"> <li>▪ Written exam</li> <li>▪ Projects</li> </ul> |
|---|--|--|

**(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:**

| Course Intended Learning Outcomes   | Teaching strategies   | Assessment Strategies  |
|---|---|--|
| <p><b>b1-</b> Analyze electrical and communication systems and processes using appropriate modeling techniques.</p> | <ul style="list-style-type: none"> <li>▪ Lectures</li> <li>▪ Simulation Programs</li> <li>▪ presentations</li> <li>▪ Lab</li> </ul> | <ul style="list-style-type: none"> <li>▪ Written exam</li> <li>▪ Projects</li> </ul> |
| <p><b>b2-</b> Interpret data related to communications networks.</p>  | <ul style="list-style-type: none"> <li>▪ Lectures</li> <li>▪ Simulation Programs</li> <li>▪ presentations</li> </ul>                | <ul style="list-style-type: none"> <li>▪ Written exam</li> <li>▪ Projects</li> </ul> |

**(C) Alignment Course Intended Learning Outcomes of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:**

| Course Intended Learning Outcomes  | Teaching strategies   | Assessment Strategies  |
|--|---|--|
| <p><b>c1-</b> Configure active components such as switches and routers and set basic network parameters.</p> | <ul style="list-style-type: none"> <li>▪ Simulation Programs</li> <li>▪ presentations</li> <li>▪ Lab</li> </ul> | <ul style="list-style-type: none"> <li>▪ Lab exam</li> </ul> |
| <p><b>c2-</b> Perform network troubleshooting and use network diagnostic tools.</p>                          | <ul style="list-style-type: none"> <li>▪ Lab</li> </ul>   | <ul style="list-style-type: none"> <li>▪ Lab exam</li> </ul> |

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| <b>(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:</b> |  |  |
|---|--|--|
| Course Intended Learning Outcomes   | Teaching strategies  | Assessment Strategies  |
| <b>d1-</b> Work effectively with minimum supervision, both individually and as a part of a team.                                | <ul style="list-style-type: none"> <li>▪ presentations</li> <li>▪ Lab</li> </ul> | <ul style="list-style-type: none"> <li>▪ Projects</li> </ul>                         |
| <b>d2-</b> Continue improving his/her professional skills.  | <ul style="list-style-type: none"> <li>▪ presentations</li> <li>▪ Lab</li> </ul> | <ul style="list-style-type: none"> <li>▪ Written exam</li> <li>▪ Projects</li> </ul> |

| <b>IV. Course Content:</b>     |                                       |                   |   |                 |               |
|--------------------------------|---------------------------------------|-------------------|---|-----------------|---------------|
| <b>A – Theoretical Aspect:</b> |                                       |                   |   |                 |               |
| Order                          | Units/Topics List                     | Learning Outcomes | Sub Topics List   | Number of Weeks | Contact hours |
| 1.                             | Course Orientation and overview       | a1, a2            | Orientation Overview  | 1               | 2             |
| 2.                             | Introduction to Networking and TCP/IP | a1, b1, d1        | Introduction, Data communications system, Network Topologies (Star, Bus, Mesh, Ring), Network types (LANs, MANs, and WANs), switching, The Internet, Accessing the Internet.  | 1               | 2             |
| 3.                             | Network Models                        | a1, b1, d1        | Protocol Layering, TCP/IP protocol suite, Layers in the TCP/IP protocol suite, Description of each layer, Encapsulation and encapsulation, addressing, Multiplexing and demultiplexing, The OSI Model, The OSI versus TCP/IP. | 1               | 2             |

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|  |                                     |                   |   |           |           |
|--|-------------------------------------|-------------------|---|-----------|-----------|
| 4.   | Transmission Media                  | a1, b1, d1, d2    | Guided media (Twisted pair cable, Coaxial cable, Fiber optic cable)   | 1         | 2         |
| 5.   | Switching                           | a2, b1, b2, d1    | Three methods of switching, Switching and TCP/IP layers, Circuit switched network (three phases, efficiency, delay), Packet switching (datagram networks, virtual circuit networks), circuit and packet switches structures | 2         | 4         |
| 6.   | Wired LANs: Ethernet                | a1, b1, b2 d1,    | Ethernet protocol, standard Ethernet, Fast Ethernet, 1GB Ethernet, and 10GB Ethernet  | 1         | 2         |
| 7.   | Other Wired Networks                | a1, b1, b2 d1, d2 | Telephone networks, Cable networks, SONET, ATM  | 2         | 4         |
| 8.   | Connecting Devices and Virtual LANs | a1, b1, d1, d2    | Connecting Devices (Hubs, Switches, Routers), Virtual LANs (Membership,   | 1         | 2         |
| 9.   | Connecting Devices and Virtual LANs | a1, b1, d1, d2    | Configuration, Communications between switches, Advantages of VLANs)  | 1         | 2         |
| 10.  | Network Layer                       | a2, b1, b2, d1    | Network Layer Services (Packetizing, Routing and Forwarding, other services), IPv4 Addresses (Address Space, Classful Addressing, Classless   | 2         | 4         |
| 11.  | Network Layer                       | a1, b1, d1, d2    | Addressing, DHCP, NAT), Forwarding of IP Packets (Forwarding based on Destination Address, Forwarding based on Label, Routers as Packet Switches), Congestion Control   | 1         | 2         |
| <b>Number of Weeks /and Units Per Semester</b> |                                     |                   |   | <b>14</b> | <b>28</b> |

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| <b>C - Practical Aspect:</b>                   |                        |                 |               |                           |
|--|------------------------|-----------------|---------------|---------------------------|
| Order  | Tasks/ Experiments     | Number of Weeks | Contact hours | Learning Outcomes         |
| 1.   | Static & Default Route | 2               | 4             | a2, b2, c1, c2. d1        |
| 2.   | Summarization          | 1               | 2             | a2, b1, b2, c1, c2. d1    |
| 3.   | RIPv2 Routing Protocol | 1               | 2             | a2, b1, b2, c1, c2. d1    |
| 4.   | DHCP                   | 1               | 2             | a2, b1, b2, c1, c2. d1    |
| 5.   | NAT                    | 1               | 2             | a2, b1, b2, c1, c2. d1    |
| 6.   | OSPF Routing Protocol  | 2               | 4             | a2, b1, b2, c1, c2. d1    |
| 7.   | BGP Routing Protocol   | 1               | 2             | a2, b1, b2, c1, d1        |
| 8.   | IPv6                   | 2               | 4             | a2, b1, b2, c1, c2. d1,d2 |
| <b>Number of Weeks /and Units Per Semester</b> |                        |                 |               |                           |

| <b>V. Teaching strategies of the course:</b> |                        |
|--|------------------------|
| -  | Interactive Lectures   |
| -  | Demonstrations         |
| -  | Class discussion       |
| -  | Problem Based Learning |
| -  | Practical classes      |

| <b>VI. Assignments:</b> |              |                        |          |          |
|-------------------------|--------------|------------------------|----------|----------|
| No                      | Assignments  | Aligned CILOs(symbols) | Week Due | Mark     |
| 1.                      | Homework     | All                    | Weekly   | 2.5      |
| 2.                      | Lab. Reports | b1, c1,c2,d1, d2       | Weekly   | 2.5      |
| <b>Total</b>            |              |                        |          | <b>5</b> |

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| VII. Schedule of Assessment Tasks for Students During the Semester: |                          |                  |            |                                |                                  |
|---|--------------------------|------------------|------------|--------------------------------|----------------------------------|
| No.   | Assessment Method        | Week Due         | Mark       | Proportion of Final Assessment | Aligned Course Learning Outcomes |
| 1.  | Assignments              | Weekly           | 10         | 5%                             | b1, c1, c2, d1, d2               |
| 2.  | Participation            | Weekly           | 10         | 5%                             | All                              |
| 3.  | Written Midterm Test     | 7 <sup>th</sup>  | 20         | 10%                            | All                              |
| 4.  | Final Design Project     | 13 <sup>th</sup> | 20         | 10%                            | All                              |
| 5.  | Final Exam (practical)   | 14 <sup>th</sup> | 20         | 10%                            | B1, b2, c1, c2, d1, d2           |
| 6.  | Final Exam (theoretical) | 15 <sup>th</sup> | 120        | 60%                            | All                              |
| <b>Total</b>  |                          |                  | <b>200</b> | <b>100%</b>                    |                                  |

| VIII. Learning Resources:  |  |
|--|--|
| <ul style="list-style-type: none"> <li>Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).</li> </ul> |  |
| <b>1- Required Textbook(s) (maximum two ).</b>   |  |
| 1-   | Behrouz A. Frozen, 2013, Data Communications and Networking – 5th Edition USA - McGraw-Hill.                           |
| <b>2- Essential References.</b>  |  |
| 1-   | James F. Kurose and Keith W. Ross, 2013, COMPUTER NETWORKING A Top-Down Approach - 6th Edition – USA - Addison-Wesley. |
| <b>3- Electronic Materials and Web Sites etc.</b>  |  |
| 1-   | <a href="http://www.mhhe.com/forouzan">http://www.mhhe.com/forouzan</a>  |

| IX. Course Policies: |   |
|----------------------|---|
| 1.                   | <p><b>Class Attendance:</b><br/>                     A student should attend not less than 75 % of total hours of the subject; otherwise he will not be able to take the exam and will be considered as exam failure. If the student is absent due to illness, he/she should bring an approved statement from university Clinic</p> |
| 2.                   | <p><b>Tardy:</b></p>  |

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|----|--|
|    | For late in attending the class, the student will be initially notified. If he repeated lateness in attending class he will be considered as absent.   |
| 3. | <b>Exam Attendance/Punctuality:</b><br>A student should attend the exam on time. He is Permitted to attend an exam half one hour from exam beginning, after that he/she will not be permitted to take the exam and he/she will be considered as absent in exam-  |
| 4. | <b>Assignments &amp; Projects:</b><br>The assignment is given to the students after each chapter; the student has to submit all the assignments for checking on time-  |
| 5. | <b>Cheating:</b><br>For cheating in exam, a student will be considered as fail. In case the cheating is repeated three times during his/her study the student will be disengaged from the Faculty-   |
| 6. | <b>Plagiarism:</b><br>Plagiarism is the attending of a student the exam of a course instead of another student. If the examination committee <b>proved</b> a plagiarism of a student, he will be disengaged from the Faculty. The final disengagement of the student from the Faculty should be confirmed from the Student Council Affair of the university. |
| 7. | <b>Other policies:</b><br>- Mobile phones are not allowed to use during a class lecture. It must be closed, otherwise the student will be asked to leave the lecture room<br>- Mobile phones are not allowed in class during the examination.<br>Lecture notes and assignments my given directly to students using soft or hard copy                         |

|                    |  |
|--------------------|--|
| <b>Reviewed By</b> | <b><u>Vice Dean for Academic Affairs and Post Graduate Studies: Asst. Prof. Dr. Tarek A. Barakat</u></b><br><b><u>President of Quality Assurance Unit: Assoc. Prof. Dr. Mohammed Algorafi</u></b><br><b><u>Name of Reviewer from the Department: Asst. Prof. Dr. Adel Ahmed Al-Shakiri</u></b> |
|                    | <b><u>Deputy Rector for Academic Affairs Asst. Prof. Dr. Ibrahim AlMutaa</u></b><br><b><u>Assoc. Prof. Dr. Ahmed Mujahed</u></b><br><b><u>Asst. Prof. Dr. Munasar Alsubri</u></b>  |

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Department  
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Abbas