

**College of Information Technology**

**Department of Information Technology**

**COURSE SYLLABUS/ SPECIFICATION**

**Course Code & Title: ITCS 335 - IT Infrastructure**

**Weight: (2 – 2 – 3)**

**Prerequisite: ITCS 214**

**NQF Level Allocated: 7**

**NQF Notional Hours / Credits: 120 notional hours/ 12 NQF credit**

**Description:**

This course provides the fundamental networking skills required to deploy and support Network Operating System (NOS) in most organizations. It covers IP fundamentals, remote access technologies, and more advanced content including Software Defined Networking. This course is intended for existing IT professionals who have some networking knowledge and experience and are looking for a single course that provides insight into core and advanced networking technologies in NOS.

**Objectives:**

1. To critically understand, plan and implement IPv4 network, DHCP, IPv6, DNS, IPAM, Direct Access and VPN.
2. To gain expertise in implementing networking for branch offices, Software Defined Networking, network virtualization, and Network Controller.
3. To be competent in planning networks and remote access.
4. To develop the skills to configure advanced networking features, and advanced Microsoft Hyper-V networking features
5. To help students gain experience of working as a member of a networking team.

**Semester:**

**Instructor(s):**

**Office Telephone: Email (s):**

**Intended Learning Outcomes (ILOs):**

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| 1. **Knowledge and Understanding**
 | **NQF Descriptor/ Level** |
| **A1** | **Concepts and Theories:** Recognize essential concepts and principles related to IT infrastructure solution, such as clients, servers, network devices, wired and wireless network. | Knowledge: theoretical understanding[Level 7] |
| **A2** | **Contemporary Trends, Problems and Research:** N/A | N/A |
| **A3** | **Professional Responsibility:** N/A | N/A |
| 1. **Subject-specific Skills**
 | **NQF Descriptor/ Level** |
| **B1** | **Problem Solving:** Identify, evaluate and select an integrated IT infrastructure (hardware, software, architectures, and services) to best fulfill a real life organizational requirements | Knowledge: Practical Application[Level 7]Skills: Communication, ICT& Numeracy[Level 7] |
| **B2** | **Modeling and Design:** N/A | N/A |
| **B3** | **Application of Methods and Tools:** Apply advancedtools and techniques to plan and implement a computer network. | Knowledge: Practical Application[Level 7]Skills: Communication, ICT& Numeracy[Level 7] |
| 1. **Critical-Thinking Skills**
 | **NQF Descriptor/ Level** |
| **C1** | **Analytic skills:** Critically analyze an existing IT infrastructure, identify its strengths and weaknesses, and develop a roadmap for future evolution | Generic Problem Solving & Analytical skills [Level 7] |
| **C2** | **Synthetic:** Critically identify and diagnose basic computer communication problems and to develop the necessary strategies to work towards their resolution | Generic Problem Solving & Analytical skills [Level 7] |
| **C3** | **Creative Thinking and innovation:** N/A | N/A |
| 1. **General and Transferable Skills (other skills relevant to employability and personal development)**
 | **NQF Descriptor/ Level** |
| **D1** | **Communication:**  | N/A |
| **D2** | **Teamwork and Leadership:** Work collaboratively in a team to complete a task. | Competence: Autonomy, Responsibility and Context [Level 7] |
| **D3** | **Organizational and Developmental Skills:** Demonstrate ability to organize ideas and effectively allocate time in given assignment or project | Competence: Autonomy, Responsibility and Context [Level 7] |
| **D4** | **Ethics and Social Responsibility:** N/A | N/A |

**Course Structure (Outline)**

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| **Week** | **Hours****Lect. - Lab** | **ILOs** | **Topics** | **Teaching Method** | **Assessment Method** |
| 1 | 4 - 0 | A1 | Introduction to computer networks, the definition of IT infrastructure and IP addressing basics. | Lecture/ In-Class Supervised Work | In-ClassExercises |
| 2 | 2 - 2 | B1, B3 | Planning IPv4 network, Configuring an IPv4 host, Managing and troubleshooting IPv4 network connectivity | Lecture/ In-Lab Supervised Work | In-LabExercises |
| 3 | 2 - 2 | B1, B3, C1, C2, D2, D3 | Planning the IPv4 address assignments, Verifying IPv4 and Troubleshooting IPv4Implementing and troubleshooting an IPv4 network | Lecture/ In-Lab Supervised Work | In-LabExercises/Assignment I |
| 4 | 2 - 2 | A1, B1, B3, C1, C2 | Overview of the DHCP server role, Deploying DHCP, Managing and troubleshooting DHCPImplementing DHCP | Lecture/ In-Lab Supervised Work | In-LabExercises |
| 5 | 2 - 2 | B1, B3 | Planning a DHCP server implementation, Implementing the DHCP configuration, Validating the DHCP implementation | Lecture/ In-Lab Supervised Work | In-LabExercises |
| 6 | 2 - 2 | A1, B1, B3 | Overview of IPv6 addressing, Configuring an IPv6 host, Implementing IPv6 and IPv4 coexistence, | Lecture/ In-Lab Supervised Work | In-LabExercises |
| 7 | 2 - 2 | B1, B3, C1, C2 | Transitioning from IPv4 to IPv6, Configuring and evaluating IPv6 transition technologies | Lecture/ In-Lab Supervised Work | In-LabExercises/Lab Test I |
| 8 | 2 - 2 | B1, B3 | Implementing DNS servers, Configuring zones in DNS, Configuring name resolution between DNS zones | Lecture/ In-Lab Supervised Work | In-LabExercises |
| 9 | 2 - 2 | B1, B3, D2, D3 | Configuring DNS integration with Active Directory Domain Services (AD DS)Planning and implementing name resolution by using DNS | Lecture/ In-Lab Supervised Work | In-LabExercises/Assignment II |
| 10 | 2 - 2 | A1, B1, B3, C1, C2 | Overview of IPAM, Deploying IPAM. Managing IP address spaces by using IPAMImplementing IPAMInstalling the IPAM Server feature, Provisioning the IPAM Server, Managing IP address spaces by using IPAM | Lecture/ In-Lab Supervised Work | In-LabExercises |
| 11 | 2 - 2 | A1, B1, B3 | Overview of remote access, Implementing the Web Application Proxy, Implementing Web Application Proxy, Validating the Web Application Proxy deployment | Lecture/ In-Lab Supervised Work | In-LabExercises |
| 12 | 2 - 2 | A1, B1, B3, C1, C2 | VPN concepts, Planning VPNs, Implementing VPNs, Validating the VPN deployment, Troubleshooting VPN access | Lecture/ In-Lab Supervised Work | In-LabExercises |
| 13 | 2 - 2 | A1, B1, B3, C1, C2 | Networking features and considerations for branch offices, Implementing Distributed File System (DFS) for branch offices, Implementing BranchCache for branch offices | Lecture/ In-Lab Supervised Work | In-LabExercises/Lab Test II |
| 14 | 2 - 2 | A1, B1, B3, D2, D3 | Overview of high performance networking features, Configuring advanced Microsoft Hyper-V networking features | Lecture/ In-Lab Supervised Work | In-LabExercises/Assignment III |
| 15 | 2 - 2 | A1, B1, B3 | Overview of SDN, Implementing network virtualization, Implementing Network Controller | Lecture/ In-Lab Supervised Work |  |
| 16 | 2 - 0 |  | All Topics |  | Final Exam |

**Teaching Materials:**

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| **Textbook(s):** | Microsoft, (2016), Networks with Windows server**.** |
| **Handout(s):** | **-** Internal handouts (Hardcopies) prepared by course instructors.**-** PowerPoint slides available on Moodle i.e. <http://www.ahlia.edu.bh/moodle> |
| **Reference(s):** | -  Kozierok, C.M., 2005. The TCP/IP guide: a comprehensive, illustrated Internet protocols reference. No Starch Press.- Laan, S., 2017. IT Infrastructure Architecture-Infrastructure Building Blocks and Concepts Third Edition. Lulu. com. |

**Assessments:**

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| **Method of Assessment** | **Description** | **Learning Outcomes** | **Weighting** |
| **Assignments** | Three group assignments to be given to students, each assignment worth 10 marks. The assignments contain several questions designed to help students consolidate the concepts learned. | A1, B1, B3, C1, C2, D2, D3 | **30%** |
| **Lab Tests** | Two practical tests to be given to students during lab time where each will take two hours and worth 15 marks. The total of both tests will be considered at the end. The first test will cover topics from week 1 to 7 and the second test will cover topics from week 8 to 13. | B1, B3, C1, C2 | **30%** |
| **Final Exam** | The final exam is a comprehensive, written exam and will be of 2 hours. It will assess students’ knowledge and skills. | A1, B1, C1, C2 | **40%** |
| **In- Lab Exercises** | In-Lab Exercises will allow the students to practice planning and implementing the covered topics. | B1, B3, C1, C2 | **Formative** |
| **Overall** | **100 %** |

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| **Admissions** |
| **Minimum number of students** | 5 |
| **Maximum number of students** | 20 |

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