

**COLLEGE OF INFORMATION TECHNOLOGY**

**DEPARTMENT OF INFORMATION TECHNOLOGY**

**COURSE SYLLABUS/ SPECIFICATION**

**Course Code & Title:** ITCS 444 - Cloud Services Implementation

**Weight:** (2- 2 - 3)

**Prerequisite:** ITCS 442

**NQF Level Allocated:** Level 8

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

**Description:** This course teaches IT professionals how to provision and manage services in Microsoft Azure. Students will learn how to implement infrastructure components such as virtual networks, virtual machines, containers, web and mobile apps, and storage in Azure. Students also will learn how to plan for and manage Azure AD, and configure Azure AD integration with on-premises Active Directory domains.

**Objective:**

1. Describe Cloud architecture components, including infrastructure, tools, and portals.  Implement and manage virtual networking within Cloud and configure cross-premises connectivity.
2. Plan and create Cloud Azure VMs.
3. Configure, manage, and monitor Cloud Azure VMs to optimize availability and reliability.
4. Implement Cloud Azure App Service.
5. Plan and implement storage, backup, and recovery services.
6. Implement container-based workloads in Cloud Azure.
7. Deploy, configure, monitor, and diagnose cloud services.
8. Manage an Active Directory infrastructure in a hybrid environment.
9. Automate operations in Azure by using Azure Automation runbooks.

**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:** Demonstrate critical knowledge and understanding of specialist theories, principles, concepts, and detailed knowledge of some of cloud services and its Implementations. | Knowledge: theoretical understanding  [Level 8] |
| **A2** | **Contemporary Trends, Problems and Research:** N/A |  |
| **A3** | **Professional Responsibility:**N/A |  |

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| 1. **Subject-specific Skills** | | **NQF Descriptor/ Level** |
| **B1** | **Problem Solving:** Design the solution to a given problem in a cloud services. Gather, and organize material from various sources independently (including library, electronic and online resources), and critically evaluate its significance. | Knowledge: Practical  Application  [Level 8]  Skills: Communication, ICT  & Numeracy  [Level 8] |
| **B2** | **Modeling and Design:** Specify and design components needed to implement cloud services in Microsoft Azure to meet the desired needs within realistic constraints. | Knowledge: Practical  Application  [Level 8] |
| **B3** | **Application of Methods and Tools:** Utilize Azure virtual networks tools for developing a framework of cloud. | Knowledge: Practical  Application  [Level 8]  Skills: Communication, ICT  & Numeracy  [Level 8] |

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| 1. **Critical-Thinking Skills** | | **NQF Descriptor/ Level** |
| **C1** | **Analytic skills:** Critically analyze case studies and recommend suitable solutions Applications. | Generic Problem Solving & Analytical skills [Level 8] |
| **C2** | **Synthetic:** Students will demonstrate the skills required to find, evaluate, and apply information to solve a problem. Students will use critical thinking skills for computer-based access, analysis, and presentation of information. | Generic Problem Solving & Analytical skills [Level 8] |
| **C3** | **Creative Thinking and innovation:**N/A |  |

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| 1. **General and Transferable Skills (other skills relevant to employability and personal development)** | | **NQF Descriptor/ Level** |
| **D1** | **Communication:** Show ability to communicate technical information in appropriate oral and written forms to a variety of audiences. | Communication, ICT and  Numeracy Skills  [Level 8] |
| **D2** | **Teamwork and Leadership:** Ability to work effectively as a member of a development team. | Competence: Autonomy,  Responsibility and Context  [Level 8] |
| **D3** | **Organizational and Developmental Skills:** Understand and explain the quantitative dimensions of a problem. | Competence: Autonomy,  Responsibility and Context  [Level 8] |
| **D4** | **Ethics and Social Responsibility:**N/A |  |

**Course Structure (Outline)**

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| **Week** | **Hours** | | **ILOs** | **Topics** | **Teaching Method** | **Assessment Method** |
| **Lec.** | **Lab** |
| 1 | 2 | - | A1 | Module 1: Introduction to Microsoft Azure | Lecture/ Class  Discussion |  |
| - | 2 | B1, B2, C1, D1 | Lab: Managing Microsoft Azure | Lecture/ In-  Class Supervised Work/ Lab Demonstration | In- Lab-Exercises |
| 2 | 2 | - | A1, B1, C1, C2 | Module 2: Implementing and managing Azure networking | Lecture/  In-Class Supervised Work | In-Class Exercises |
| 2 | - | 2 | A1, B2, B3 | Lab A: Using a deployment template and Azure PowerShell to implement Azure virtual networks | Lecture/  In-Lab Supervised Work | In- Lab-Exercises |
| 3 | 2 | - | B1, C2, | Module 2: Implementing and managing Azure networking (*continued*) | Lecture/ In-Class  Supervised Work | In-Class Exercises |
| 3 | - | 2 | A1, B2, B3 | Lab B: Configuring VNet peering | Lecture/ Lab  Demonstration | In- Lab-Exercises |
| 4 | 2 | - | A1, B1, B2, B3, C1, D3 | Module 3: Implementing virtual machines | Lecture/ In-Class  Supervised Work / Independent Learning | In-Class Exercises |
| 4 | - | 2 |  | Lab A: Deploying Azure VMs | Lecture/ Lab  Demonstration | In- Lab-Exercises |
| 5 | 2 | - | B1, B2, C1 | Module 3: Implementing virtual machines (*continued*) | Lecture/ In-Class  Supervised Work | In-Class Exercises |
| 5 | - | 2 | A1, B1, B3, C1 | Lab B: Deploying Azure VMs by using Azure Resource Manager templates | Lecture/  In- Lab Supervised Work/ Debate | In- Lab-Exercises |
| 6 | 2 | - | A1, B1, C1, C2 | Module 4: Managing Azure VMs | Lecture/ In-Class  Supervised Work | In-Class Exercises |
| - | 2 | A1, B1, B2, B3, C1, D3 | Lab: Managing Azure VMs | Lecture/ In-Lab  Supervised Work / Independent Learning | In- Lab-Exercises/ Assignment (Week6) |
| 7 | 2 | - | B1, B2, C1 | Module 5: Implementing Azure App Service | Lecture/ In-Class  Supervised Work | Oral  Participation / In-Class Exercises |
| - | 2 | C1, C2, | Lab: Implementing web apps | Lecture/ In-Lab  Supervised Work | In- Lab-Exercises |
| 8 | 2 | - | B1, B2, B3, C2, | Module 6: Planning and implementing storage, backup, and recovery services | Lecture/ In-Class  Supervised Work | Oral  Participation / In-Class Exercises |
| - | 2 | B1, B2, B3, C1, C2, | Lab: Planning and implementing Azure Storage | Lecture/ In-Lab  Supervised Work | In- Lab-Exercises |
| 9 | 2 | - | C1, C2, | Module 7: Implementing containers in Azure | Lecture/ In-Class  Supervised Work | In-Class Exercises |
| - | 2 | B1, B3, C1 | Lab A: Implementing containers on Azure VMs | Lecture/ Lab  Demonstration | In- Lab-Exercises |
| 10 | 2 | - | A1, B1, B2, B3, C1, C2, | Module 7: Implementing containers in Azure (*continued*) | Lecture/ In-Class  Supervised Work | Major Test/In-Class Exercises |
| - | 2 | A1, B1, B3, C1 | Lab B: Implementing Azure Container Service | Lecture/ In-Class  Supervised Work/ Debate | In- Lab-Exercises |
| 11 | 2 | - | B1, B2, C1 | Module 8: Implementing Azure Cloud Services | Lecture/ In-Class  Supervised Work | In-Class Exercises |
| - | 2 | B1, C2, | Lab: Implementing Azure Cloud Services | Lecture/ Lab  Demonstration | In- Lab-Exercises |
| 12 | 2 | - | B1, B2, B3, C1, C2, | Module 9: Implementing Azure Active Directory | Lecture/ In-Class  Supervised Work | Oral  Participation / In-Class Exercises |
| 12 | - | 2 | A1, B1, B2, B3, C1, D3 | Lab: Implementing Azure AD | Lecture/ In-Lab  Supervised Work / Independent Learning | In- Lab-Exercises |
| 13 | 2 | - | A1, B1, B2, , C2, | Module 10: Managing an Active Directory infrastructure in a hybrid environment | Lecture/ In-Class  Supervised Work | In-Class Exercises |
| 13 | - | 2 | B1, B2, B3, C1, C2, | Lab: Implementing and managing Azure AD synchronization | Lecture/ In-Lab  Supervised Work | In- Lab-Exercises /Lab Project (Week13) |
| 14 | 2 | - | B1, B2, C1, | Module 11: Implementing Azure-based management and automation | Lecture/ In-Class  Supervised Work | In-Class Exercises |
| 14 | - | 2 | B3, C1, C2, | Lab: Implementing Automation | Lecture/ Lab  Demonstration | In- Lab-Exercises |
| 15 | 2 | 2 | B1, B2, B3, C1, C2,  D1, D2, D3 | Student Projects | Project Supervision | Evaluation of  Project Report and Presentation |
| 16 | 2 | 2 | A1, B1, B2, C1, C2 | All Topics |  | Final Exam |

**Teaching Materials:**

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| **Textbook(s):** | Washam, Michael, Rick Rainey, Dan Patrick, and Steve Ross. (2018),  *Implementing Microsoft Azure Infrastructure Solutions*. Microsoft Press. |
| **Handout(s):** | Aavailable on Moodle i.e. <http://www.ahlia.edu.bh/moodle> |
| **Reference(s):** | 1. Rittinghouse, John W., and James F. Ransome. (2016), *Cloud computing: implementation, management, and security*. CRC press. 2. Bhowmik, Sandeep. (2017), *Cloud Computing*. Cambridge University Press. 3. Raja, C. Venish, K. Chitra, and M. Jonafark. (2018), A Survey on Mobile Cloud Computing. |

**Assessment**

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| **Method of Assessment** | **Description** | **Learning Outcomes** | **Weighting** |
| In-Lab  Exercises | Each practical exercise consists of a set of practical tasks to be implemented by students individually in lab as shown in the above weekly structure. Each of the exercises assesses the student’s skills in the field of programming application. Students work will be observed and evaluated directly during the lab sessions | B3 | Formative |
| In-Class  Exercises | In-class exercises consist of problem solving and analysis  questions. | B1, B2, C1 | Formative |
| Oral  Participation | Students will be questioned orally to demonstrate their understanding and knowledge of the topics covered during class lectures and lab sessions. | A1 | Formative |
| Assignment | Students will be asked for one assignment. The purpose of the assignments is to assess students where they have to demonstrate their extensive and detailed knowledge and critical understanding of key concepts, theories, methods, tools and techniques of cloud services. The assignment will also assess students’ skills to solve and analyze different Cloud techniques and services. | A1, B1, B2, C1, D3 | 10% |
| Lab Project | Students will be asked to develop one small programs, to implement and administrate the functionality of Cloud tools. | B1, B2, B3, D3 | 10% |
| Major Test | The test will be an in-class 90 minute exam that will consists of short-answer, essay, and create web or windows application and cover the topics studied in the first 9 weeks | A1, B1, B2, C1 | 20% |
| Project | Starting from weak 4, the students will be formed as a group of 3-5 students and each group will be asked to develop an Application project. In the final week, each group will have to submit their research report explaining the research problem, research methods used, analysis and the conclusion highlighting the research findings and results. The report must explain precisely the work accomplished by each student. Each group will be required to make a presentation summarizing the research conducted and its findings. Each group member has to participate in the presentation. Group-based work will be examined and evaluated as a whole as well as the individual work of each student. Group members will be tested individually during the presentation by peers and the instructor. | B1,B2, B3,C1,C2, D1, D2, D3 | 20% |
| Final Exam | The final exam is comprehensive and practical and will be of two hours duration. It will consist of short-answer, essay and problem-solving questions to be done on computers. | A1, B1, B2, C1, C2 | 40% |
| **Overall:** | | | **100 %** |

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

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| **Ahlia University values academic integrity. Therefore, all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the Code of Student Conduct and Disciplinary Procedures (see** [www.ahlia.edu.bh/integrity](http://www.ahlia.edu.bh/integrity) **for more information).** |