

**COLLEGE OF INFORMATION TECHNOLOGY**

**DEPARTMENT OF INFORMATION TECHNOLOGY**

**COURSE SYLLABUS/ SPECIFICATION**

**Course Code & Title:** ITCS 409 - Operating systems

**Weight: (3 - 0 - 3)**

**Prerequisite:** ITCS 214

**NQF Level Allocated:** Level 8

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

**Description:** This course is to cover the concepts, structure, and functions of operating system (OS). Students will learn how an operating system provides an environment in which users can execute programs in a convenient and efficient manner. Topics covered include computer system and OS structure; process management: process, threads, CPU scheduling, process synchronization, deadlocks; memory management; mass storage management, and file systems.

**Objective:**

1. To critically understand the specialist theories, principles and concepts of modern operating systems.

2. To explain the fundamental structure of modern operating system and its core functions and services.

3. To critically examine and evaluate different strategies and techniques used by operating systems to manage computer recourses.

4. To examine the algorithmic ideas integrated in the design and implementation of different operating systems.

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| **SEMESTER:** |  | **ACADEMIC YEAR:** |
| **INSTRUCTOR:** | | |
| **OFFICE TEL:** | | |
| **EMAIL:** | | |

**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 the concepts of operating system, its architecture and functions. | Knowledge: theoretical understanding  [Level 8] | | | |
| **A2** | | | **Contemporary Trends, Problems and Research:** Demonstrate critical knowledge and understanding of major current issues of computer recourses management and methods of handling these problems in modern operating systems. | Knowledge: theoretical understanding  [Level 8] | | | |
| ***A3*** | | | ***Professional Responsibility: N/A*** | ***N/A*** | | | |
| 1. **Subject-specific Skills** | | | | | **NQF Descriptor/ Level** | |
| **B1** | | **Problem Solving:** Use a range of approaches to critically analyze and evaluate practices of operating systems in identifying, defining and solving problems by using alternative effective and efficient algorithms. | | | Knowledge: Practical  Application  [Level 8]  Skills: Communication, ICT &Numeracy  [Level 8] | |
| **B2** | | **Modeling and Design:** Use a range of specialist models to model the problems of computer and communication systems, such as deadlock, and design efficient and effective handling procedures. | | | Knowledge: Practical  Application  [Level 8] | |
| ***B3*** | | ***Application of Methods and Tools:*** *N/A* | | | ***N/A*** | |
| 1. **Critical-Thinking Skills** | | | | | **NQF Descriptor/ Level** | |
| **C1** | | | **Analytic skills:** Critically analyze and evaluate the performance and effectiveness of different algorithms used by different operating systems. | | Generic Problem Solving & Analytical skills [Level 8] | |
| ***C2*** | | | ***Synthetic****:* ***N/A*** | | ***N/A*** | |
| ***C3*** | | | **Creative Thinking and innovation:** Extend knowledge in operating system to construct specific and effective solution to manage and control computer resources. | | Generic Problem Solving & Analytical skills [Level 8] | |
| 1. **General and Transferable Skills (other skills relevant to employability and personal development)** | | | | | | **NQF Descriptor/ Level** | | |
| **D1** | **Communication:** Show ability to communicate information in appropriate oral and written forms. | | | | | Communication, ICT and  Numeracy Skills  [Level 8] | | |
| ***D2*** | ***Teamwork and Leadership: N/A*** | | | | | ***N/A*** | | |
| **D3** | **Organizational and Developmental Skills:** Demonstrate ability to organize ideas and effectively allocate time in given assignment. | | | | | Competence: Autonomy,  Responsibility and Context  [Level 8] | | |
| ***D4*** | ***Ethics and Social Responsibility: N/A*** | | | | | ***N/A*** | | |

**Course Structure (Outline)**

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| **Week** | | **Hours** | | | | **ILOs** | | **Unit/Module or Topic Title** | | **Teaching Method** | | **Assessment**  **Method** | |
| **Lec.** | | **Lab** | |
| 1 | | 3 | | - | | A1 | | Introduction | | Lecture | | Oral Participation | |
| 2 | | 3 | | - | | A1 | | Computer Hardware  Structure Overview | | Lecture/ Class  Discussion | | Oral Participation | |
| 3 | | 3 | | - | | A1 | | Operating System Concepts  and Structure | | Lecture/ Class  Discussion | | Quiz1 | |
| 4 | | 3 | | - | | A1 | | **Process:** Concepts, States,  Operations, Process  Communication | | Lecture/ Class  Discussion | | Oral Participation | |
| 5 | | 3 | | - | | A1 | | **Threads:** Benefits, Multi-  core Systems | | Lecture/ Class  Discussion | | Oral Participation | |
| 6 | | 3 | | - | | A1, B1,  C1 | | **Memory Management** | | Lecture/ In-Class  Supervised Work | | In-Class  Exercises/ Assignment1 | |
| 7 | | 3 | | - | | A1, B1 | | **Virtual Memory** | | Lecture/ Class  Discussion | | Oral Participation | |
| 8-9 | | 6 | | - | | A2, B1,  B2, C1, C3 | | **Process Management:**  Process Synchronization and Scheduling | | Lecture/ Independent Learning/ In-Class Supervised Work | | In-Class  Exercises/ Major Test (week 8) | |
| 10 | | 3 | | - | | A2, B1, B2, C1, C3, D1, D3 | | **Process Management:**  Deadlocks | | Lecture/ In-Class  Supervised Work | | In-Class  Exercises/Quiz 2 (Week 10)/ Assignment2 | |
| 11 | | 3 | | - | | A1, B1,  B2, C1, | | **Mass Storage Management** | | Lecture/ In-Class  Supervised Work / Independent Learning | | In-Class Exercises/ Quiz 3 | |
| 12 | | 3 | | - | | A1, B1, C1, D1, D3 | | **System administrations and File-Systems** | | Lecture/ Class  Discussion | | Assignment3/ Quiz 4 | |
| 13-14 | | 6 | | - | | B1, C1 | | **System administration: Linux** | | In Lab Demonstration  In-Lab Supervised  Work | | In-Lab Exercises | |
| 15 | | 3 | | - | | - | | Revision | | Class Discussion | |  | |
| 16 | | 2 | | - | | A1, A2,  B1, B2, C1, C3 | | All Topics | |  | | Final Exam | |

**Teaching Materials:**

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| **Textbook(s):** | 1. Silberschatz A., Galvin P. B. and Gagne G. (2015) *Operating System Concepts, 9*th Edition, Wiley.. |
| **Handout(s):** | Available on Moodle i.e. <http://www.ahlia.edu.bh/moodle> |
| **Reference(s):** | 1. Silberschatz, Abraham, Greg Gagne, and Peter B. Galvin. (2018), Operating system concepts. Wiley. 2. Jain, Manish. (2018) Basic System Administration. Beginning Modern Unix. Apress, Berkeley. 3. Mchose A. and Flynn I. M. (2011) Understanding Operating Systems, Sixth Edition, Cengage Learning. 4. Tanenbaum A. S. and Woodhull A. S. (2006) Operating Systems Design and Implementation, Third Edition, Pearson Hall. |

**Assessment**

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| **Type of Assessment** | **Description** | **ILOs** | **Weighting** |
| Quizzes | Four written quizzes to be conducted where  the average of best two quizzes will be considered. | A1 | 10 % |
| Assignments | Three Assignments to be given to students,  each assignment worth 10%. The assignments will assess students’ awareness of the current trends and advancements in operating systems. It will include verity of case studies and implementation of some operating system concepts and techniques. | A2, B1, B2, C1, C3, D1, D3 | 30 % |
| In-Class Exercises | In-class exercises consisting mainly of  problem solving and analysis questions. | B1, B2, C1 | Formative |
| Oral Participation | In-class participation and discussion will  assess student understanding of several concepts and theories. | A1 | Formative |
| Major Test | The major test is a written, in-class 90  minutes test. It will cover topics studied in the first eight weeks. The majority of the test’s questions are problem solving and analysis questions. | A1, B1, B2, C1 | 20 % |
| Final Exam | The final exam is a comprehensive, written  exam and will be of two hours. It will consist of problem solving, short-answer, analysis, and essay questions. | A1, A2, B1, B2, C1, C3 | 40% |
| **Overall** |  |  | **100%** |

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| **Admissions** | |
| **Minimum number of students** | **5** |
| **Maximum number of students** | **25** |

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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).** |