

**COLLEGE OF INFORMATION TECHNOLOGY**

**DEPARTMENT OF INFORMATION TECHNOLOGY**

**COURSE SYLLABUS/ SPECIFICATION**

**Course Code & Title:** ITCS 214 - Computer systems

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

**Prerequisite:** ITCS 101

**NQF Level Allocated:** Level 6

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

**Description:** This course is an introduction to the fundamental concepts of computer systems and their performance analysis. It explores how computers execute programs and manipulate data. Topics covered include: data representation of primitive data types, machine-level programming, digital logic, memory organization and management, I/O devices and storage devices. In addition, it covers the techniques used to improve computer performance and to solve its problems.

**Objective:**

1. To explain various data representation methods of the basic data types.

2. To introduce the physical structure of ALU and logic design.

3. To help students understand the behavior of processor by introducing the instruction set and assembly programming.

4. To recognize and describe different kinds of storage systems and I/O devices.

5. To introduce the concepts of evaluating and improving computer system performance.

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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 a broad knowledge of the concept and theories of computer system, such as digital logic, data representation and manipulation, and storage systems. | Knowledge: theoretical understanding  [Level 6] | | | |
| **A2** | | | **Contemporary Trends, Problems and Research:** Demonstrate awareness of the current trends and advancements in computer systems. | Knowledge: theoretical understanding  [Level 6] | | | |
| ***A3*** | | | ***Professional Responsibility: N/A*** |  | | | |
| 1. **Subject-specific Skills** | | | | | **NQF Descriptor/ Level** | |
| **B1** | | **Problem Solving:** Demonstrate knowledge of the methods and techniques used to solve the problems of computer systems and thus improve its performance, as well as to solve computational problems using logic circuit design and assembly programming. | | | Knowledge: Practical  Application  [Level 6]  Skills: Communication, ICT &Numeracy  [Level 6] | |
| **B2** | | **Modeling and Design:** Model the structure of ALU and design simple logic circuits to implement different kind of operations. | | | Knowledge: Practical  Application  [Level 6] | |
| ***B3*** | | ***Application of Methods and Tools:*** *N/A* | | |  | |
| 1. **Critical-Thinking Skills** | | | | | **NQF Descriptor/ Level** | |
| **C1** | | | **Analytic skills:** Demonstrate the ability to analyze the computer system performance and identify the computer problems. | | Generic Problem Solving & Analytical skills [Level 6] | |
| ***C2*** | | | ***Synthetic:*** *N/A* | |  | |
| ***C3*** | | | ***Creative Thinking and innovation: N/A*** | |  | |
| 1. **General and Transferable Skills (other skills relevant to employability and personal development)** | | | | | | **NQF Descriptor/ Level** | | |
| **D1** | **Communication:** Express and communicate ideas in written and oral form. | | | | | Communication, ICT and  Numeracy Skills  [Level 6] | | |
| ***D2*** | ***Teamwork and Leadership: N/A*** | | | | |  | | |
| **D3** | **Organizational and Developmental Skills:** Ability to work effectively as a member of a development team. | | | | | Competence: Autonomy,  Responsibility and Context  [Level 6] | | |
| ***D4*** | ***Ethics and Social Responsibility: N/A*** | | | | |  | | |

**Course Structure (Outline)**

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| **Course Structures (Outline)** | | | | | | | | | | | | | | |
| **Week** | | | **Hours** | | | **ILOs** | | | **Unit/Module or Topic Title** | **Teaching**  **Method** | | | **Assessment**  **Method** | |
| **Lec.** | **Lab** | |
| 1 | | | 3 | - | | A1 | | | Syllabus- Introduction | Lecture | | |  | |
| 2-3 | | | 6 | - | | A1, B1, C1 | | | **Data Representation:**  To describe numbering systems, data type size and numeric range, as well as different representation techniques to represent real, integer, Boolean, memory address, and characters together with performance evaluation. | Lecture/ In-Class Supervised Work | | | In-Class  Exercises/ Quiz 1 (week3) | |
| 4-6 | | | 9 | - | | A1, B1, C1 | | | **Data Storage:**  To describe the three types of storage devices, with performance evaluation and data format. | Lecture/ In-Class Supervised Work | | | In-Class Exercises/ Assignment1 | |
| 7-8 | | | 6 | - | | A1, B1, B2, C1 | | | **Processor Technology and**  **Architecture:**  To describe Boolean Algebra, logic design. | Lecture/ In-Class Supervised Work | | | In-Class  Exercises/ Quiz 2 | |
| 9 | | | 3 | - | | A1, B1 | | | **Processor Technology and**  **Architecture:**  To describe instruction set, assembly programming | Lecture/ In-Class Supervised Work | | | In-Class Exercises | |
| 10-11 | | | 6 | - | | A1, A2, D1, D3 | | | **Processor Technology and**  **Architecture:**  To describe addressing modes and CPU concepts. | Lecture/ Independent Learning | | | Major Test (week10)/ Assignment 2 | |
| 12 | | | 3 | - | | A1, B1, C1 | | | **System Integration and**  **Performance:**  To describe: system bus, I/O ports, interrupt, fault tolerance, Cache and Buffers. | Lecture/ In-Class Supervised Work | | | In-Class Exercises/ Quiz 3 | |
| 13 | 3 | | | - | | A1, B1, C1 | **System Integration and**  **Performance:**  To describe: parallel processing. | | | Lecture/ In- Class Supervised Work | In-Class Exercises | |
| 14 | 3 | | | - | | A1 | **I/O Devices:**  Common I/O device types with their characteristics | | | Lecture/ Class  Discussion | Quiz 4 | |
| 15 | 3 | | | - | | A1, A2, D1, D3 | **I/O Devices:**  Memory mapped I/O and  DMA. | | | Lecture/  Independent  Learning |  | |
| 16 | 2 | | | - | | A1, B1, B2,  C1 | **All Topics** | | |  | Final Exam | |

**Teaching Materials:**

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| **Textbook(s):** | 1. Stallings W. (2015) *Computer Organization and Architecture: Designing for Performance,* 10th Edition, Pearson.  2. Burd, S. D. (2010) *Systems Architecture*, Cengage Learning. |
| **Handout(s):** | Available on Moodle i.e. <http://www.ahlia.edu.bh/moodle> |
| **Reference(s):** | 1. Siewiorek, D. and Swarz, R., (2017). Reliable Computer Systems: Design and Evaluatuion. Digital Press.  2. Fu, K.S., (2018). Special computer architectures for pattern processing. CRC press.  3. Brookshear J. (2011) Computer Science: An Overview, 11thEdition, Addison- Wesley.  4. Hamacher C., Vranesic Z., Zaky S. and Manjikian N. (2011) Computer Organization and Embedded Systems, McGraw-Hill.  5. Patterson D. and Hennessy J. (2013) Computer Organization and Design, 5th Edition, Newnes |

**Assessment**

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| **Type of**  **Assessment** | **Description** | | ILOs | | | Weighting | |
| Quizzes | Four written quizzes to be conducted with  different question types like: problem solving and short-answer. Each quiz is for 30 minutes. The total of best three quizzes will be considered, each worth 5%. | | A1, B1, B2, C1 | | | 15% | |
| Assignments | Two assignments to be given to students, each  assignment worth 15%, and the total is the average of two assignments. The assignments will assess students’ awareness in the current trends and advancements in computer systems. | | A2, D1, D3 | | | 15% | |
| In-Class  Exercises | In-class exercises consisting mainly of problem  solving and performance analysis questions. | | B1, B2, C1 | | | Formative | |
| Major Test | | | The major test is a written, in-class 90 minutes  test. It will cover topics studied in the first nine weeks. The test will include several types of questions such as: short-answer, essay and problem solving. | | A1, B1, B2, C1 | 30% | |
| Final Exam | | | The final exam is a comprehensive, written exam  and will be of two hours. It will consist of problem solving, short-answer and essay questions. | | A1, B1, B2, C1 | 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).** |