

**COLLEGE OF INFORMATION TECHNOLOGY**

**DEPARTMENT OF INFORMATION TECHNOLOGY**

**COURSE SYLLABUS/SPECIFICATION**

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| **CODE& TITLE:** | **ITCS 327 – Software Engineering II** | |
| **WEIGHT:** | **(3 - 0 - 3)** |  |
| **PREREQUISITE:** | **ITCS 313** |  |
| **DESCRIPTION:** | The aim of this course is to hone skills in developing and testing of code, executing a program, and improving software’s performance or locating certain types of faults. Students actively participate in the main software development activities that straddle the production of an initial implementation and the delivery of the complete system. The following topics are covered: software implementation, software testing in the broader context of software engineering, Software Quality that testing aims to achieve, Control flow testing, and Data flow testing. | |
| **OBJECTIVES:** | 1. To critically understand the definitions of software implementation, testing and software qualities.  2. To demonstrate the types of various software testing techniques.  3. To understand the importance of considering static techniques for the assessment of software work product.  4. To apply the principal approaches to software testing, together with their associated techniques.  5. To critically understand implementation patterns, coding style and standard to produce quality code. | |
| **SEMESTER:** |  | **ACADEMIC YEAR:** |
| **INSTRUCTOR:** | | |
| **OFFICE TEL.:** | | |
| **EMAIL:** | | |

**INTENDED LEARNING OUTCOMES (ILOS)**

Upon successful completion of the course, students should be able to:

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| **A. Knowledge and Understanding** | |
| **A1** | Concepts and Theories: Demonstrate advanced knowledge and understanding of essential  facts, concepts and specialist theories relating to the implementation, testing, and software quality. |
| **A2** | Contemporary Trends, Problems and Research: NA |
| **A3** | Professional Responsibility: NA |

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| **B. Subject-Specific Skills** | |
| **B1** | Problem Solving: Solve the problems of software implementation, installation, and quality  using advanced specialized techniques. |
| **B2** | Modeling and Design: Design test cases for testing software quality characteristics, such as  effectiveness, reliability and accuracy. |
| **B3** | Application of Methods and Tools: NA |

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| **C. Thinking Skills** | |
| **C1** | Analytic: Critically analyze software problems, identify what to test and choose the test  conditions using test cases. |
| **C2** | Synthetic: NA |
| **C3** | Creative: Demonstrate creativity in the development of effective software testing cases for  producing reliable, accurate and compatible software. |

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| **D. General and Transferable Skills (Other Skills Relevant to Employability and Personal**  **Development)** | |
| **D1** | Communication: Show the ability to communicate clearly to convey complex information  and ideas in appropriate oral and written forms. |
| **D2** | Teamwork and Leadership: NA |
| **D3** | Organizational and Developmental Skills: Demonstrate the ability to organize ideas and  effectively allocate time in given assignment. |
| **D4** | Ethical and Social Responsibility: Demonstrate an understanding and adhere to the ethical,  legal and professional issues and significant responsibilities pertaining to software testing. |

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| **Course Structure (Outline)** | | | | | | |
| **Week** | **Hours** | | **ILOs** | **Unit/Module or Topic Title** | **Teaching**  **Method** | **Assessment**  **Method** |
| **Lec.** | **Lab** |
| 1 | 3 |  | A1 | **Introduction to Software**  **Engineering II** | Lecture/ Class  Discussion |  |
| 2 | 3 |  | A1, B1 | **Software Implementation and Installation** | Lecture/ Class  Discussion | Case Study |
| 3 | 3 |  | A1 | **Software Testing:**  Basic Concepts  A Software Testing Lifecycle. | Lecture/ Class  Discussion | Quiz1 |
| 4 | 3 |  | A1, B1 | **Testing throughout the software life cycle:**  V-Model. | Lecture/ In-  Class Supervised Work | In-Class  Exercises |
| 5 | 3 |  | A1, B1 | **Static Techniques:** Review Process Inspection. | Lecture/ In-  Class Supervised Work | In-Class  Exercises |
| 6 | 3 |  | A1, B1, B2, C1 | **Control Flow Testing:**  Statement Coverage. | Lecture/ In-  Class Supervised Work | In-Class  Exercises |
| 7 | 3 |  | B1, B2, C1, C3, D1, D3 | **Control Flow Graphs:**  Branch Coverage. | Lecture/ In-  Class Supervised Work | Assignment 1 |
| 8 | 3 |  | A1, B1, B2, C1 | **Control Flow Coverage**: Path Coverage. | Lecture/ In-  Class Supervised Work | Quiz 2 |
| 9 | 3 |  | B1, B2, C1 | **Data-Flow Testing:**  Data-Flow Graph. | Lecture/ In-  Class Supervised Work | In-Class  Exercises |
| 10 | 3 |  | B1, B2, C1 | **Data-Flow Testing:**  Data Flow Coverage | Lecture/ In-  Class Supervised Work | Major Test |
| 11 | 3 |  | B1, B2, C1 | **Mutation Testing** | Lecture/ In-  Class Supervised Work | In-Class  Exercises |
| 12 | 3 |  | A1, C1 | **Unit Testing:**  Static Unit Testing, | Lecture/ In- Class | In-Class  Exercises |

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|  |  |  |  | Dynamic Unit Testing. | Supervised  Work |  |
| 13 | 3 |  | A1, B1, B2, C1, D4 | **Integration Testing**: System Testing. | Lecture/ In-  Class Supervised Work | Quiz 3 |
| 14 | 3 |  | A1, B1, B2,  C1, D1, D3, D4 | **Acceptance Testing:**  Types of Acceptance Testing. | Lecture/  Independent  Learning | Assignment 2 |
| 15 | 3 |  | A1, B1, C1 | **Software Quality:**  Software Quality Standard. | Lecture/ In-  Class Supervised Work | Case Study |
| 16 | 2 |  | A1, B1, C1 | **All Topics** |  | Final Exam |

**TEACHING MATERIALS:**

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| **TEXTBOOK(S):** | Graham D., Veenandaal E. V., Evans I. and Black R. (2012) *Foundations of Software Testing,* 3rd Edition. ISTQB certification compliant.Spillner A., Linz T. and Schaefer H. (2014) Software Testing Foundations, 4th Edition, ISTQB certification Compliant. |
| **HANDOUT(S):** | PowerPoint slides available on Moodle i.e. <http://www.ahlia.edu.bh/moodle> |
| **REFERENCE(S):** | 1. Aditya M.P. (2014) *Foundations of Software Testing*, 2ndEdition, Addison- Wesley.  2. Tagarden D.P.(2015) *Systems Analysis and design with UML*,5thEdition  International Student Version, Wiley.  3. SommervilleI. (2015) *Software engineering*, 10th Edition, Addison Wesley.  4. Ammann P. and Offutt J.(2017) *Introduction to Software Testing*, 2nd Ed.  Cambridge University Press.  5. [Naik](http://eu.wiley.com/WileyCDA/Section/id-302479.html?query=Kshirasagar%2BNaik) K. and [Tripathy](http://eu.wiley.com/WileyCDA/Section/id-302479.html?query=Priyadarshi%2BTripathy) P. (2011) *Software Testing and Quality Assurance: Theory and Practice* , John Wiley & Sons.  6. Mili A. and Tchier F. (2015) Software *Testing: Concepts and Operations*, John Wiley & Sons. 7. Hoffer J. A., George J. and Valacich J. A. (2016) *Modern Systems Analysis and Design,* 8th Edition, Pearson. |

**ASSESSMENTS:**

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| **Type of**  **Assessment** | | **Description** | **ILOs** | **Weighting** |
| Assignments | | The assignment consists of essay, problem-solving and  research based theoretical questions regarding topics in software testing. The purpose of the assignment is to assess  students where they have to demonstrate their extensive and  detailed knowledge and critical understanding of key concepts of software testing. Students will be given two assignments (each worth 10%). | B1, B2,  C1, C3, D1, D3, D4 | 20% |
| Major Test | The test will be an in-class 90 minutes exam that will consist  of short-answer, essay, and problem solving questions and cover the topics studied in the first 8 weeks. | A1, B1, B2, C1 | 30% | |
| Quizzes | The quizzes will consist of MCQs, and short-answer  questions. The purpose of the quiz is to assess the students’ knowledge and understanding of key concepts, principles and theories of software testing. Students will be given three quizzes and best two will be considered. | A1 | 10% | |
| Final Exam | The final exam is comprehensive and will be of two hours  duration. It will consist of short-answer, essay and problem- solving questions. | A1, B1, B2, C1, D4 | 40% | |
| Case Studies | Different software project cases are analyzed and studied. | C1, D4 | Formative | |
| In-Class  Exercises | In-class exercises consisting mainly of problem solving  questions. | B1, B2 | Formative | |
| **Overall** |  |  | **100%** | |

***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).***