



COLLEGE OF INFORMATION TECHNOLOGY  
DEPARTMENT OF INFORMATION TECHNOLOGY  
COURSE SYLLABUS/ SPECIFICATION

**Course Code & Title:** ITCS 327 – Software Engineering II

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

**Prerequisite:** ITCS 313

**NQF Level Allocated:** 7

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

**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.

**Objective:**

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:

Instructor (s):

Office Telephone: EXT:

Email (s):

Intended Learning Outcomes (ILOs):

A. Knowledge and Understanding		NQF Descriptor/ Level
A1	<b>Concepts and Theories:</b> Demonstrate advanced knowledge and understanding of essential facts, concepts and specialist theories relating to the implementation, testing, and software quality.	Knowledge: theoretical understanding [Level 7]
A2	<b>Contemporary Trends, Problems and Research:</b> N/A	N/A
A3	<b>Professional Responsibility:</b> N/A	N/A
B. Subject-specific Skills		NQF Descriptor/ Level
B1	<b>Problem Solving:</b> Solve the problems of software implementation, installation, and quality using advanced specialized techniques.	Knowledge: Practical Application [Level 7] Skills: Communication, ICT & Numeracy [Level 7]
B2	<b>Modeling and Design:</b> Design test cases for testing software quality characteristics, such as effectiveness, reliability and accuracy.	Knowledge: Practical Application [Level 7]
B3	<b>Application of Methods and Tools:</b> N/A	N/A
C. Critical-Thinking Skills		NQF Descriptor/ Level
C1	<b>Analytic skills:</b> Critically analyze software problems, identify what to test and choose the test conditions using test cases.	Generic Problem Solving & Analytical skills [Level 7]
C2	<b>Synthetic:</b> N/A	N/A
C3	<b>Creative:</b> Demonstrate creativity in the development of effective software testing cases for producing reliable, accurate and compatible software.	Generic Problem Solving & Analytical skills [Level 7]
D. General and Transferable Skills (other skills relevant to employability and personal development)		NQF Descriptor/ Level
D1	<b>Communication:</b> Show the ability to communicate clearly to	Communication,

	convey complex information and ideas in appropriate oral and written forms.	ICT and Numeracy Skills [Level 7]
<b>D2</b>	<b>Teamwork and Leadership: N/A</b>	<b>N/A</b>
<b>D3</b>	<b>Organizational and Developmental Skills:</b> Demonstrate the ability to organize ideas and effectively allocate time in given assignment.	Competence: Autonomy, Responsibility and Context [Level 7]
<b>D4</b>	<b>Ethical and Social Responsibility:</b> Demonstrate an understanding and adhere to the ethical, legal and professional issues and significant responsibilities pertaining to software testing.	Competence: Autonomy, Responsibility and Context [Level 7]

### Course Structure (Outline)

Week	Hours		ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
	Lec.	Lab				
1	3		A1	<b>Introduction to Software Engineering II</b>	Lecture/ Class Discussion	
2	3		A1, B1	<b>Software Implementation and Installation</b>	Lecture/ Class Discussion	Case Study
3	3		A1	<b>Software Testing:</b> Basic Concepts A Software Testing Lifecycle.	Lecture/ Class Discussion	Quiz1
4	3		A1, B1	<b>Testing throughout V-Model.</b>	Lecture/ In-Class Supervised Work	In-Class Exercises
5	3		A1, B1	<b>Static Techniques:</b> Review Process Inspection.	Lecture/ In-Class Supervised Work	In-Class Exercises
6	3		A1, B1, B2, C1	<b>Control Flow Testing:</b> Statement Coverage.	Lecture/ In-Class Supervised Work	In-Class Exercises
7	3		B1, B2, C1, C3, D1, D3	<b>Control Flow Graphs:</b> Branch Coverage.	Lecture/ In-Class Supervised Work	Assignment 1

8	3		A1, B1, B2, C1	<b>Control Flow Coverage:</b> Path Coverage.	Lecture/ In-Class Supervised Work	Quiz 2
9	3		B1, B2, C1	<b>Data-Flow Testing:</b> Data-Flow Graph.	Lecture/ In-Class Supervised Work	In-Class Exercises
10	3		B1, B2, C1	<b>Data-Flow Testing:</b> Data Flow Coverage	Lecture/ In-Class Supervised Work	Major Test
11	3		B1, B2, C1	<b>Mutation Testing</b>	Lecture/ In-Class Supervised Work	In-Class Exercises
12	3		A1, C1	<b>Unit Testing:</b> Static Unit Testing, Dynamic Unit Testing.	Lecture/ In-Class Supervised Work	In-Class Exercises
13	3		A1, B1, B2, C1, D4	<b>Integration Testing:</b> System Testing.	Lecture/ In-Class Supervised Work	Quiz 3
14	3		A1, B1, B2, C1, D1, D3, D4	<b>Acceptance Testing:</b> Types of Acceptance Testing	Lecture/ Independent Learning	Assignment 2
15	3		A1, B1, C1	<b>Software Quality:</b> Software Quality Standard.	Lecture/ In-Class Supervised Work	Case Study
16	2		A1, B1, C1	<b>All Topics</b>		Final Exam

### Teaching Materials:

<b>Textbook(s):</b>	<ol style="list-style-type: none"> <li>Brian Hambling, Peter Morgan, Angelina Samaroo, Geoff Thompson, Peter Williams (2019) <i>Software Testing: An ISTQB-BCS Certified Tester Foundation guide</i>, 4<sup>th</sup> Edition. BCS, Chartered Institute for IT.</li> <li>Spillner A., Linz T. and Schaefer H. (2014) <i>Software Testing Foundations</i>, 4<sup>th</sup> Edition, ISTQB certification Compliant.</li> </ol>
<b>Handout(s):</b>	Available on Moodle i.e. <a href="http://www.ahlia.edu.bh/moodle">http://www.ahlia.edu.bh/moodle</a>

<b>Reference(s):</b>	<ol style="list-style-type: none"> <li>1. Aditya M.P. (2014) <i>Foundations of Software Testing</i>, 2<sup>nd</sup> Edition, Addison- Wesley.</li> <li>2. Tagarden D.P. (2015) <i>Systems Analysis and design with UML</i>, 5<sup>th</sup> Edition International Student Version, Wiley.</li> <li>3. SommervilleI. (2015) <i>Software engineering</i>, 10th Edition, Addison Wesley.</li> <li>4. Ammann P. and Offutt J. (2017) <i>Introduction to Software Testing</i>, 2<sup>nd</sup> Ed. Cambridge University Press.</li> <li>5. Naik K. and Tripathy P. (2011) <i>Software Testing and Quality Assurance: Theory and Practice</i>, John Wiley &amp; Sons.</li> <li>6. Mili A. and Tchier F. (2015) <i>Software Testing: Concepts and Operations</i>, John Wiley &amp; Sons.</li> <li>7. Hoffer J. A., George J. and Valacich J. A. (2016) <i>Modern Systems Analysis and Design</i>, 8th Edition, Pearson.</li> </ol>
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### Assessment

Method of Assessment	Description	Learning Outcomes	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	A1, B1,	40%

	consist of short-answer, essay and problem-solving questions.	B2, C1, D4	
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
<b>Overall:</b>			<b>100 %</b>

<b>Admissions</b>	
<b>Minimum number of students</b>	5
<b>Maximum number of students</b>	25

**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).**