الجامعة الأهلية
AHLIA UNIVERSITY
BAHRAIN

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

Course Code & Title: ITCS 516 – Object Oriented Programming

Weight: (3 - 0 - 3)

Prerequisite: None

Description:

An intensive course on object-oriented programming (OOP) paradigm and advanced techniques of the Java language. Topics include: Java, Object Model, Classes and Objects, Constructors and Destructors, Inheritance, Virtual Functions and Polymorphism, Operator Overloading, Exceptions, Generic Programming and Standard Template Library.

Objective:

1. To overview the fundamental concepts of object-oriented programing.
2. To explain the design of programs with the object-oriented (OO) paradigm making proper use of inheritance, and polymorphism.
3. To apply object–oriented concepts and software development tools (programming editor, compiler, and debugger) in developing Java programs.
4. To emphasize the importance of abstraction and the reuse of java programs.

Semester: 1

Instructor (s): Dr. Subha

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Intended Learning Outcomes (ILOs):

A. Knowledge and Understanding	**NQF Level**
A1. Concepts and Theories: Demonstrate knowledge and understanding of Object Oriented Programming paradigm and design such as Object, Class, Data Abstraction and Encapsulation, Inheritance, Polymorphism.	Knowledge: theoretical understanding [Level 8]
B. Subject-Specific Skills	**NQF Level**
B1 Problem Solving: Develop a formal definition of real life problems and solve them by developing an algorithmic solution, basic programming constructs and Object Oriented Programming.	Knowledge: Practical Application [Level 8] Skills: Communication, ICT & Numeracy [Level 8]
B2. Modeling and Design: Develop models for real-world problems and design their solutions using Object Oriented Programming by specifying the Objects, Classes, and their respective set of Properties and Methods using UML models.	Knowledge: Practical Application [Level 8]
B3. Application of Methods and Tools: Apply the appropriate methods and techniques to design, implement and test Object Oriented Programming using UML, JAVA and Eclipse IDE.	Knowledge: Practical Application [Level 8] Skills: Communication, ICT & Numeracy [Level 8]
C. Critical Thinking Skills	**NQF Level**
C1. Analytic: Analyze and evaluate the performances of different phases in Object Oriented Programming and identify scope, objectives and characteristics in addition to the requirements for every step.	Generic Problem Solving & Analytical skills [Level 8]
C2. Synthetic: Choose the best suitable techniques, algorithms, and data structures to design and develop efficient Object Oriented Programming to solve new problems.	Generic Problem Solving & Analytical skills [Level 8]
D. General and Transferable Skills	**NQF Level**
D1. Communication: Demonstrate ability to communicate information in appropriate oral and written forms using UML, flowcharts and pseudo codes that are necessary to depict problem solving.	Communication, ICT and Numeracy Skills [Level 8]
D3. Organizational and Developmental Skills: Engage in life-long learning and continuing self-development to enhance and practice professional and organizational skills in order to effectively prioritize, plan, manage and allocate appropriate time to implement and test object oriented programs.	Competence: Autonomy, Responsibility and Context [Level 8]

Course Structure (Outline)

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Week	**Hours**		**ILOs**	**Topics**	**Teaching Method**	**Assessment Method**
	Lec.	**Lab**				
1	3	-	A1,B1,C2	**Introduction to OOP:** Features of OOP, OOP Concepts and Themes, Benefits of OOP.	Lecture/ class discussions	Class Participation
2	3	-	A1,B1,B2, B3,C2	**OOP Paradigm & Themes:** Defining a Class, Attributes and Methods of a Class, Static Members, and Objects as Function Arguments.	Lecture/ class discussions	Class Participation
3-4	6	-	A1,B1,B2, B3,C2	**OOP Paradigm & Themes:** Default and Explicit Constructors, Parameterized Constructors, Multiple Constructors in a Class.	Lecture / Lab demonstration	Assignment 1
5	3	-	A1,B1,B2, B3,C2,D1	**Introduction to UML**	Lecture/ Lab demonstration	Class Participation
6	3	-	A1,B3,D1,D3	**Introduction to Eclipse and Java Language**	Lecture/ Lab demonstration	In-lab practical Exercise 1 / Class Participation
7	3	-	A1,B1,B2, B3,C2,D1	**Inheritance:** Superclasses and Subclasses, Single Inheritance, Is-a Relationship, Class Hierarchies.	Lecture/ Lab demonstration	Quiz/In lab exercise
8	3	-	A1,B1,B2, B3,C2,D1,D3	**Inheritance:** Syntax of Java Inheritance, The super Reference Method, Overriding.	Lecture/ Lab demonstration	In-lab practical Exercise 2
9	3	-	A1,B1,B2, B3,C1,C2, D1	**Polymorphism:** Pointers to Objects, This Pointer, Abstract Classes, Abstract Methods, Signature of a method, Overriding abstract methods, Arrays of related objects.	Lecture/ Lab demonstration	Written Test / Class Participation

10	3	-	A1,B1,B2, B3,C1,C2,D1 ,D3	**Polymorphism:** The Object class, The instance of operator, Interfaces, Defining an Interface, How a class implements an interface.	Lecture/ Lab demonstration	In-lab practical Exercise 3 / Class Participation
11	3	-	A1,B1,B2, B3,C1,C2, D1,D3	**Exception Handling:** Exceptions and Exception Types, Throwing Exceptions, Catching Exceptions. Creating Your Own Exception Classes, The finally Clause Cautions, chained exceptions, precondition and preconditions, Assertions.	Lecture/ Lab demonstration	Assignment 2
12	3	-	A1,B1,B2, B3,C1,C2, D1,D3	**Generics:** Introduction and motivation for Generic types and methods, Examples of generic types and methods	Lecture/ Lab demonstration	In-lab practical Exercise 4 / Class Participation
13	3		A1,B1,B2, B3,C1,C2, D1	**Generics:** Generic methods, overloading generic methods. Generic Classes, Generics and inheritance	Lecture/ Lab demonstration	Class Participation
14	3		A1,B1,B2, B3,C1,C2, D1,D3	**Abstract Data Types & Java Collection Package**	Lecture/ Lab demonstration	In-Class practical Exercise 5 / Class Participation
15	3		A1,B1,B2, B3,C1,C2, D1,D3	**Abstract Data Types & Java Collection Package Revision**	Lecture	Class Participation
16	2					Final Exam

ASSESSMENT:

Type of Assessment[1]	Description[2]	ILOs[3]	Weighting
Assignment 1	The assignment consists of some short-answer and essay questions on object oriented concepts and theories covered in class up to week 3. Soft copy submission is required by the end of the 4th week	A1,B1,B2, B3,C2	10%

	through the course page in Moodle where answers will be checked by Turnitin against plagiarism.		
Assignment 2	The assignment consists of some short-answer and essay questions on object oriented concepts and theories covered in class up to week 11, in addition to programming questions where the student is required to design, implement and test some Java programs by using object oriented methodology. Soft copy submission is required by the end of the 12th week through the course page in Moodle where answers will be checked by Turnitin against plagiarism. Java programs will be submitted electronically to be tested.	A1,B1,B2, B3,C1,C2, D1,D3	10%
In-lab Practical Exercises	Each of the five practical exercises consists of a set of practical tasks to be implemented by students individually in class as shown in the above weekly structure. Each of the exercises assesses the students skills in the application of object oriented methods and techniques to code and test JAVA programs using Eclipse IDE. Students work will be observed and evaluated directly during the lab sessions.	Exercise 1: A1,B3,D1,D3	2%
		Exercise 2: A1,B1,B2, B3,C2,D1,D3	2%
		Exercise 3: A1,B1,B2, B3,C1,C2, D1,D3	2%
		Exercise 4: A1,B1,B2, B3,C1,C2, D1,D3	2%
		Exercise 5: A1,B1,B2, B3,C1,C2, D1,D3	2%
Quiz	The quiz will consist of MCQs, short-answer, essay, and problem solving questions and will cover the topics studied in the first 7 weeks. The duration of the quiz is 20 minutes and will be taken in class. The purpose of the quiz is to assess the students' knowledge and understanding of key concepts, principles and theories of OOP as well as their skills in problem solving and modeling and design using UML.	A1,B1,B2,D1	10%
Written Test	The written test will be an in-class 1-hour test that will consists of MCQs, short-answer, essay, and problem solving questions and cover the topics studied in the first 9 weeks. Students will be asked	A1,B1,B2, B3,C1,C2, D1	20%

	also to write some parts of Java programs to solve problems using object oriented methodology.		
Final Exam	The final exam is comprehensive and will be of two hours duration. It will consist of MCQs, short-answer, essay and problem-solving questions in object oriented concepts and theories as well as Java programming language. Students will be asked also to design algorithmic solutions to some defined problems using the appropriate Object-oriented paradigms, methods and techniques and to define and model precisely the required objects and classes and highlight their components and relationships using UML.	A1,B1,B2, B3,C1,C2, D1	40%
		Overall	100%

TEACHING MATERIALS:

TEXTBOOK(S): Deitel P.J., Deitel H.M. - Java How to Program, 11th Edition, 2019.

HANDOUT(S): Instructor's power point slides, http://www.ahlia.edu.bh/moodle.

REFERENCE(S):

1. D.S. Malik, *Java Programming: From Problem Analysis to program Design*, Course Technology, Cengage Learning, 2012.

2. Y. Daniel Liang, *Introduction to Java Programming, Brief Version*, 9e, 2013.

3. Ken Arnold, James Gosling, The Java Programming Language, Addison – Wesley, 1996.

4. David Arnow, Gerald Weiss, Introduction to Programming Using Java: An Objects Oriented Approach, Addison Wesley, 1998.

5. Head First Java, 2nd Edition 2nd Edition by Kathy Sierra (Author), Bert Bates (Author) #1 Best Seller in Java Programming.
6. Effective Java 3rd Edition by Joshua Bloch (Author), 2018, ISBN-13: 978-0134685991,ISBN-10: 0134685997.

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