National University of Computer & Emerging Sciences (NUCES) CFD Campus
Department of Computer Science

COURSE OUTLINE FALL 2021

Course Tittle: Software Design and Analysis
Course Code: CS 3004
Credit Hours: 03

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DESCRIPTION & OBJECTIVES

In this course, the students will learn how to produce detailed object models and designs from software/system requirements; use the modeling concepts provided by UML; identify use cases and expand into full behavioral designs; expand the analysis into a design ready for implementation and construct designs that are reliable.

TEXTBOOK(S)/SUPPLEMENTARY READINGS

1. Applying UML and patterns: An introduction to Object-Oriented Analysis and Design and Iterative Development by Craig Larman, Prentice Hall; 3rdEdition (October 30, 2004). ISBN-10: 0131489062
2. Fundamental of Object-Oriented Design in UML by Meiler Page-Jones, Addison Wesley, 2000. ISBN: 020169946X.
3. The Unified Modeling Language User Guide by G. Booch, J. Rambaugh and I. Jakobson, Addison-Wesley Professional; 2ndEdition (2005). ISBN-10: 0321267974.
4. The Unified Modeling Language Reference Manual by James Rumbaugh, Ivar Jacobson and Grady Booch, Addison-Wesley Professional; 2ndEdition (2004). ISBN-10: 032171895X.
5. The Unified Modeling Language User Guide by Grady Booch, James Rumbaugh and Ivar Jacobson, Addison-Wesley Professional; (2005). ISBN-10: 0321267974.
6. Visual Modeling with Rational Rose 2000 and UML by Terry Quatrani, Addison Wesley, 2000. ISBN: 0201699613.
7. The Rational Unified Process Made Easy: A Practitioner's Guide to the RUP: A Practitioner's Guide to the RUP by Per Kroll, Philippe Kruchten and Grady Booch, Addison-Wesley Professional (2003). ISBN-10: 0321166094.
8. The Rational Unified Process: An Introduction by Philippe B. Kruchten, Addison-Wesley Professional; 3rdEdition (2003). ISBN-10: 0321197704.

CONTENTS

Principles of Object Technology. UML Unification, UML Diagrams, Unified Process & Rational Unified Process, RUP Disciplines, Requirements Types, Use Case Modeling. EBP Guidelines. System Use Case Diagram, Use Case Table, Activity Diagram, Supplementary Specifications, Vision Document, Glossary, Rational Rose Overview. Elaboration Phase of RUP; Configuration Management; System Sequence Diagram, Domain Model. Implementation of System Sequence & Domain Model. Use Case Dependencies. Analysis Use Case Diagram, Implementation of Sequence, Collaboration, Analysis

Use Case Diagram. State Chart Diagrams and Implementation. Design Patterns. Use Case Realization Using GRASP Patterns, Design Model. Modeling Generalization, Creating Design Class Diagram, Mapping Data Model to Domain Model. Implementation of Design Class Diagram, Coding patterns, Mapping Design to Code. Patterns for Assigning Responsibilities, Polymorphism, Pure Fabrication, Indirection, Protected Variation. GoF Design Patterns.

COURSE SCHEDULE (TENTATIVE)

Week	Topics and Readings	Assignment/Quiz
1.	Introduction and Course Organization, Object Oriented Analysis and Design	
2.	Iterative development and The Unified process	Quiz 1
3.	Inception, Understanding Requirements	Assignment 1
4.	Use-Case Model: Writing Requirements in Context	Assignment 2
5.	Other Requirements, From Inception to Elaboration	Quiz 2
6.	Requirements Modeling, Conceptual classes, domain models, associations/attributes in domain models	
7.	**First Session Exams**	
8.	Behavioral Modeling System Sequence Diagram	Assignment 3
9.	Introduction to logical architecture, Package Diagram	Quiz 3
10.	UML Class Diagram	Assignment 4
11.	Behavioral Modeling using Activity Diagrams, Mapping Design to code	Quiz 4
12.	**Second Session Exams**	
13	Behavioral Modeling using UML State machines	Assignment 5
14.	Deployment and Component Diagram	Quiz 5
15.	GRASP patterns: Information expert, Creator, Controller, Indirection, Low coupling	Assignment 6 Quiz 6
16.	GRASP patterns: High cohesion, Polymorphism, Protected variations, Pure fabrication	
17.	SOLID design principles: Single responsibility, Open–closed, Liskov substitution, Interface segregation, Dependency inversion	
18.	GoF Design Patterns	

ASSESSMENT CRITERIA

Quiz	15%
Assignments	15%
Midterm-1 Exam	15%
Midterm-2 Exam	15%
Final Exam	40%

RULES AND REGULATIONS

- Every Student is required to be punctual at the hours notified for lecture.
- An 80% attendance is necessary to appear in final examination as per university rules.