School of Computing and Information Sciences

Course Title: Software Engineering I **Date:** March 18, 2019

Course Number: CEN 4010

Number of Credits: 3

Subject Area: Software Engineering	**Subject Area Coordinator:** Peter Clarke **email:** clarkep@cis.fiu.edu
Catalog Description: Software Process Model, Software Analysis and Specification, Software Design, Software Testing	
Textbook: Bernd Bruegge, Allen H Dutoit, "Object-Oriented Software Engineering: Using UML, Patterns, and Java", 3rd Edition, Prentice Hall, ISBN 0136061257.	
References:	
Prerequisites Courses: CGS 3095 and COP 3337	
Corequisites Courses: None	

Type: Required for CS Major

Prerequisites Topics:

- Programming
- Data Structures
- Oral and written communication skills

Course Outcomes:

1. Be familiar with the Software Development Life Cycle
2. Master the techniques to gather and specify the requirements of a medium-size software system using UML
3. Master the techniques to design and implement a medium-size software system
4. Be familiar with software testing techniques
5. Be familiar with system walkthroughs
6. Be familiar with software documentation
7. Be familiar with working in a small software development team
8. Demonstrate the ability to communicate the details of the technical solution through verbal and written modes.

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Relationship between Course Outcomes and Program Outcomes

BS in CS: Program Outcomes	Course Outcomes
a) Demonstrate proficiency in the foundation areas of Computer Science including mathematics, discrete structures, logic and the theory of algorithms	
b) Demonstrate proficiency in various areas of Computer Science including data structures and algorithms, concepts of programming languages and computer systems.	3, 4
c) Demonstrate proficiency in problem solving and application of software engineering techniques	1, 2, 3, 4, 5, 6, 7
d) Demonstrate mastery of at least one modern programming language and proficiency in at least one other.	
e) Demonstrate understanding of the social and ethical concerns of the practicing computer scientist.	
f) Demonstrate the ability to work cooperatively in teams.	2, 5, 7
g) Demonstrate effective communication skills.	2, 5, 6, 7

Assessment Plan for the Course & how Data in the Course are used to assess Program Outcomes

Student and Instructor Course Outcome Surveys are administered at the conclusion of each offering, and are evaluated as described in the School's Assessment Plan: http://www.cis.fiu.edu/programs/undergrad/cs/assessment/

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Outline

Topic	Number of Lecture Hours	Outcome
• Introduction to Software Engineering o Concepts o Life Cycle Model o Products o Reviews o Development Team	6	1, 5, 6, 7
• Software Modeling o Concepts o Modeling with UML	6	1, 2, 6
• Requirement Gathering and Analysis o Concepts and Activities o Functional Requirement ▪ Scenarios and Use Cases o Non-functional requirements o Requirement Validation	12	1, 2, 5, 6, 7
• Software Design o System Design ▪ Design Goals ▪ Cohesion and Coupling ▪ Persistent Data ▪ Access Control o Object Design ▪ Object Interface ▪ Invariants ▪ Pre and post conditions	12	1, 3, 5, 6, 7
• Testing o Testing Concepts o Test Planning o Unit Testing o Integration Testing o Usability Testing	6	4, 5

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Course Outcomes Emphasized in Laboratory Projects / Assignments

Outcome	Number of Weeks
1. Software Requirement and Analysis Model Outcomes: 1,2,6,7	4
2. Software Design Document Outcomes: 1,3,6,7	4
3. Final Software Project Demonstration Outcomes: 1,2,3,4,5,6,7	4

Oral and Written Communication:

Written Reports		Oral Presentations	
Number Required	Approx. Number of pages for each	Number Required	Approx. Time for each
3 (Software Requirement, Design Document and Final System Document)	30	2	15 minutes per group (5 minutes per student)

Social and Ethical Implications of Computing Topics:

No significant coverage

Topic	Class time	Student Performance Measures

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Approximate number of credit hours devoted to fundamental CS topics

Topic	Core Hours	Advanced Hours
Algorithms:		
Software Design:		2.0
Computer Organization and Architecture:		
Data Structures:		
Concepts of Programming Languages:		

Theoretical Contents

Topic	Class time
Invariants, pre and post conditions	1.0

Problem Analysis Experiences

Software requirement and analysis model

Solution Design Experiences

1. System Design using Architectural Patterns
2. Detailed Object design using Design Patterns

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The Coverage of Knowledge Units within Computer Science Body of Knowledge[1]

Knowledge Unit	Topic	Lecture Hours
SE 1	Fundamental Design concepts and principles, Software Architecture, Object-Oriented Design	12
SE 4	Software Life-Cycle and Process Models	6
SE 5	Requirement Elicitation, Requirements Analysis Modeling Techniques, Functional and Nonfunctional requirements, Basic Concepts of Formal specification techniques	12
SE 6	Validation Planning, Testing Fundamentals, Black-box and White-box testing, Unit, integration, validation and system testing, Object-Oriented Testing, Inspections	6
SE 8	Team Management, Software measurement and scheduling techniques, Project management tools	2
SE 10	Pre and post assertions	1

[1]See http://www.computer.org/education/cc2001/final/chapter05.htm for a description of Computer Science Knowledge units