THOMAS ADEWUMI UNIVERSITY, OKO-IRESE	
Faculty	Computing and Applied Sciences
Department	Mathematical and Computing Science
Program	Computer Science
Course Code	CSC 412
Course Title	**SPECIAL TOPICS IN SOFTWARE ENGINEERING**
Study Year	4
Credit Hours	3
Contact Hours	36
Pre-requisite	
Status	Elective
Semester	First
Mode of Assessment	Lecture, Assessment and Practical
Mode of Delivery	• Classroom Lectures • Laboratory Practical Sessions
Assignment practical **Test** **Examination** **Total**	10% 20% 70% 100%
Course Lecturer and Instructor	
Course Description	A special topics course in software engineering typically focuses on specific, advanced areas within the broader field of software engineering. These courses delve into specialized topics that may not be covered extensively in a general software engineering curriculum. The specific content of a special topics course can vary depending on the instructor, student interests, and current trends in the industry.
Course Objectives	To teach the students • advanced and specialized topics within the field of software engineering beyond the introductory level. • methodologies, and techniques used in the industry to tackle complex software development challenges.

	• architectural patterns, and advanced design techniques. • Develop students ability to create scalable, maintainable, and high-performance software architectures.
Learning Outcome	At the end of this course, students will be able to: • Mention at least five(5) programming techniques and methodologies • List at least three(3) maintainable software architectures. • Describe mobile applications development • Effectively plan, execute, and manage software projects, and how to work collaboratively in agile development environments
Detailed course contents	Topics from process improvement; software re-engineering configuration management; Formal specification, software cost – estimation, Software architecture, Software patterns, Software Reuse and Open source development.

Course Contents Sequencing

Weeks	**Detailed Course Outline**	**Allocated Time**
WEEK 1	Introduction to the Chosen Specialized Topic: • Overview of the specialized topic and its relevance in software engineering • Historical background and evolution of the topic • Current trends and advancements in the field	3 Hours
WEEK 2	Advanced Software Development Techniques: • In-depth exploration of advanced programming techniques (e.g., aspect-oriented programming, functional programming, or concurrent programming) • Application of advanced development methodologies (e.g., domain-driven design, design patterns, or software product lines	3 Hours
WEEK 3, 4	Advanced Software Design and Architecture: • Detailed study of advanced software design principles (e.g., SOLID principles, design for testability, or design by contract) • In-depth exploration of architectural patterns (e.g., microservices, event-driven architecture, or serverless architecture)	6 Hours

	• Analysis and evaluation of real-world software architectures **C.A Test**	
WEEK 5, 6	Specialized Domains in Software Engineering: • Deep dive into a specific domain relevant to software engineering (e.g., cybersecurity, mobile application development, healthcare software, or financial systems) • Domain-specific challenges, standards, and regulations	6 Hours
WEEK 7,8	Advanced Software Testing and Quality Assurance: • In-depth study of advanced software testing techniques (e.g., test automation, performance testing, security testing, or mutation testing) • Quality assurance practices and methodologies (e.g., continuous integration, continuous delivery, or DevOps) • Advanced strategies for defect detection, prevention, and root cause analysis	6 Hours
WEEK 9, 10	Software Project Management and Agile Practices: • Advanced project management methodologies (e.g., Agile, Scrum, or Lean) and their application in software engineering • Agile project planning, estimation, and tracking techniques • Collaborative team practices, communication strategies, and conflict resolution in agile environments **C.A Test**	6 Hours
WEEK 11	Research and Innovation in Software Engineering: • Introduction to research methodologies in software engineering • Critical evaluation and synthesis of research papers and industry reports • Application of research findings to address software engineering challenges	3 Hours
WEEK 12	Industry Case Studies and Guest Lectures: • Presentation of real-world case studies showcasing the application of specialized topics in software engineering • Guest lectures by industry experts, sharing insights and experiences related to the chosen specialized topic	3 Hours

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<tr><td></td><td>• Opportunities for students to engage in discussions and ask questions to industry professionals</td><td></td></tr>
<tr><td></td><td>REVISION</td><td></td></tr>
<tr><td colspan="3">READING LIST:
□ The Mythical Man-Month: Essays on Software Engineering by Frederick P. Brooks Jr.
□ Design Patterns: Elements of Reusable Object-Oriented Software by Erich Gamma, Richard Helm, Ralph Johnson, and John Vlissides
□ Refactoring: Improving the Design of Existing Code by Martin Fowler
□ Code Complete: A Practical Handbook of Software Construction by Steve McConnell"Object-Oriented
□ Software Engineering: Using UML, Patterns, and Java" by Bernd Bruegge and Allen H. Dutoit</td></tr>
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