FLORIDA POLYTECHNIC UNIVERSITY

Syllabus - CEN 5035 Advanced Software Engineering

Course Information

- **Course Number and Title**: CEN 5035 Advanced Software Engineering
- **Credit Hours:** 3 (3 lecture / 0 lab)
- **Current Academic Term**: Spring 2026

Instructor Information

- **Instructor**: Dr. Karim Elish
- **Office**: BARC-2227
- **Office Hours**: MWF: 11:00 am - 12:00 pm or by appointment
- **Office Phone**: (863) 874-8646
- **E-mail**: kelish@floridapoly.edu

Course Details

- **Section**: 1
- **Class delivery mode:** Face-to-face (in-person/in-class)
- **Class Meeting Day, Time & Location**: Tuesday 4:00 pm - 6:45 pm, IST-1017
- **Course Website:** Canvas
- **Official Catalog Course Description**: This is a graduate course which covers the software development process and focuses on agile development. The course provides students with practical as well as theoretical foundation on software engineering disciplines. The course offers students first-hand experience in designing and testing complex software systems and allows them to research and apply state-of-the-art software engineering principles.
- **Course Pre and/or Co-Requisites:** Graduate Standing. Prior knowledge in Software Engineering
- **Required Textbook**: Instructor will provide the materials.
- **Equipment and Materials**: None.
- **Reference Book:**
  - "Software Engineering: Theory and Practice", 4th Edition, by Shari Pfleeger and Joanne Atlee, Prentice Hall, ISBN: 9780136061694
  - "Software Engineering" by, Ian Sommerville, ISBN-13: 978-0133943030
  - "Design Patterns: Elements of Reusable Object-Oriented Software" by Erich Gamma, Richard Helm, Ralph Johnson, and John Vlissides: ISBN-13: 978-0201633610
  - "Clean Code: A Handbook of Agile Software Craftsmanship" by Robert C. Martin: ISBN-13: 978-0132350884
  - Selected state-of-the-art papers

- **Course Objectives:** This course provides a comprehensive coverage of the discipline of software engineering and helps students to develop skills that will enable them building high quality software. This course also introduces current state-of-the-art research in software engineering.
- **Course Learning Outcomes**:
    1. Analyze and synthesize state-of-the-art software engineering research to evaluate modern methods, architectures, and practices.
    2. Identify a research-driven software engineering problem, conduct a focused literature review, and propose a feasible solution approach.
    3. Communicate advanced software engineering concepts and research findings effectively through professional technical writing and oral presentations.
- **Program Learning Outcomes:**
    1. Demonstrate mastery in analyzing complex problems and applying knowledge of computer and/or data science to formulate solutions.
    2. Communicate computer and/or data science information clearly and effectively through presentations and technical writings to both expert and non-expert audiences.
    3. Demonstrate critical evaluation of recent research literature.
    4. Identify a novel relevant research problem in a chosen computer and/or data science research field, perform the literature survey for the problem, create a plan to solve the problem, carry on the plan, and defend the research.
    5. Recognize appropriate practices in the different fields of computer science and their ethical implications.

Program Learning Outcome	**CLO-1**	**CLO-2**	**CLO-3**
Analyzing Complex Problem			
Communicating Effectively			**X**
Critical Evaluation of Research Literature	**X**		
Identify a Novel Relevant Research Problem		**X**	
Recognize Appropriate Practices			

Academic Support Resources

- **Library**: Students can access the Florida Polytechnic University Library through the University website and Canvas, on and off campus. Students may direct questions to library@floridapoly.edu.
- **Tutoring and Learning Center**: The Tutoring and Learning Center (The TLC) provides tutoring to all Florida Poly students who may need additional academic support. The TLC is staffed by students who have excelled in the courses they tutor. They offer support by reviewing concepts and materials from class, clarifying points of confusion and providing assistance with learning strategies. While the focus of TLC is to provide support to students in freshman-level courses, upper-level courses are also tutored at the Center. The TLC is located in the IST Commons (second floor).
- **Knack Tutoring**: Students looking for additional assistance outside of the classroom are advised to consider working with a peer tutor through Knack. Florida Polytechnic University has partnered with Knack to provide students with access to verified peer tutors who have previously aced this course. To view available tutors, visit floridapoly.joinknack.com and sign in with your student account.
- **Academic Success Coaches**: All students at Florida Poly are assigned an Academic Success Coach. Your Academic Success Coach can assist you with academic success strategies. Please visit the

Student Success Center on the second floor of the IST building to meet with an Academic Success Coach.

- **Writing Center**: Located on the second floor of the IST (2059/2061), the Writing Center helps students to develop their writing and presentation skills. Consultations are available in person and virtually. For more detail, visit https://floridapolytechnic.libguides.com/writingservices

Course Policies:

1. Contact Policy:

Florida Polytechnic University email is the official method of communication for the University. Students are required to check their Florida Polytechnic University email and course Canvas daily. The subject of your course-related emails must start with [CEN 5035:] followed by the topic. Failure to provide the correct subject may result in ignoring the email. Any email received from an address other than the one from Florida Polytechnic University email floridapoly.edu domain will not be replied to. Please add the course instructor's email addresses to your approved email recipients list to ensure that you will receive emails regarding this course. Please note the instructor of this course is not responsible for missed email communication directed to your spam folder.

2. Attendance:

Please see the University Policy, "Students are expected to attend all of their scheduled University classes and to satisfy all academic objectives as defined by the instructor".

- This class requires "in-person/in-class attendance".
- The attendance is part of the final grade (see next section).
- The attendance will be taken through "A+ attendance" tool in Canvas.
- In case of absence, please inform the instructor of absence in advance, if possible, or as soon as possible afterward.
- A student with an excused absence will get more time to make up missed work without any reduction in the assigned work or final course grade given that the student provides an official/documented excuse.
- Standard excused absence reasons: religious observances; legal responsibilities (jury duty, court obligations); military obligations; university-sponsored events; death or serious illness within their immediate family, or their own illness, or other reasonable circumstances.
- Exceptions to any attendance requirements may be made on a case-by-case basis.
- Campus CARE Services are available to work with students with serious or unusual circumstances. Contact care@floridapoly.edu

3. Participation:

Students are expected to participate in the classroom experience. The use of earbuds/headphones during class is specifically not allowed and students who engage in this behavior may be asked to leave the class for the day (noting exceptions for authorized accommodations). In addition, students who routinely do not bring materials to class that are required for participation, will not be given credit for class attendance, and if this becomes a pattern of behavior, may be asked to leave the class for the day. Persistent problems with participation may result in a code of conduct referral.

Participation in all course activities is a very important element of this course, is a basic expectation, and counts for part of your grade. Course participation consists of active and respectful involvement in class discussions, presentations, postings, replies, projects, and other interactions. High-quality

class participation in lecture discussions is expected. The course participation grade will take into account quality, quantity, and timeliness of student participation.

4. Late Work/Make-up work:

Late submission will be graded out of 90% of the total in the first 24 hours, and out of 80% of the total in the second 24 hours. No late submission is allowed after the 48 hours, no exceptions. This policy does not apply for excused absence, and exceptions may be made on a case-by-case basis. In general, there is no make-up for quizzes or exams. A make-up for a missed quiz or exam will be provided given that an official excuse is presented.

5. Assignment/Evaluation Methods:

Assignments/Papers Discussion	20%
Exam 1	15%
Final Exam	15%
Final Project & Presentation	50%
Total:	100%

6. Grading Scale: (See also University Grading Policy).

A	≥ 93	B	83-86	C	73-76	D	63-66
A-	90-92	B-	80-82	C-	70-72	D-	60-62
B+	87-89	C+	77-79	D+	67-69	F	< 60

7. Individual work:

For coursework (assignments and exams), you are expected to do your own work individually and privately without any discussion with other students, the use of previously graded academic work, or the use of outside resources. Failing to do so will result in treating this as a violation of the Academic Integrity policy and your penalty will be a F grade in the course.

University Policies

Reasonable Accommodations

The University is committed to ensuring equal access to all educational opportunities. The Office of Disability Services (ODS), facilitates reasonable accommodations for students with disabilities and documented eligibility. It is the student's responsibility to self-identify as a student with disabilities and register with ODS to request accommodations. If you have already registered with ODS, please ensure that you have requested an accommodation letter for this course through the ODS student portal, and communicate with your instructor about your approved accommodations as soon as possible. Arrangements for testing accommodations must be made in advance. Accommodations are not retroactive. If you are not registered with ODS but believe you have a temporary health condition or permanent disability requiring an accommodation, please contact ODS as soon as possible: DisabilityServices@floridapoly.edu; (863) 874-8770; https://floridapoly.edu/student-affairs/health-wellness/disability-services.php.

Accommodations for Religious Observances, Practices and Beliefs
The University will reasonably accommodate the religious observances, practices, and beliefs of individuals in regard to admissions, class attendance, and the scheduling of examinations and work assignments. (See University Policy.)

Title IX
Florida Polytechnic University is committed to ensuring a safe, productive learning environment on our campus that prohibits sex discrimination and sexual misconduct, including sexual harassment, sexual assault, dating violence, domestic violence and stalking. Resources are available if you or someone you know needs assistance. Any faculty or staff member you speak to is required to report the incident to the Title IX Coordinator. Please know, however, that your information will be kept private to the greatest extent possible. You will not be required to share your experience. If you want to speak to someone who is permitted to keep your disclosure confidential, please seek assistance from the Florida Polytechnic University Ombuds Office, BayCare's Student Assistance Program, 1-800-878-5470 and locally within the community at Peace River Center, 863-413-2707 (24-hour hotline) or 863-413-2708 to schedule an appointment. The Title IX Coordinator is available for any questions to discuss resources and options available.

Academic Integrity
Violations of academic integrity regulation include actions such as cheating, plagiarism, use of unauthorized resources (including but not limited to use of Artificial Intelligence tools), illegal use of intellectual property, and inappropriately aiding other students. Such actions undermine the central mission of the university and negatively impact the value of your Florida Poly degree. Suspected violations will be fully investigated, possibly resulting in sanctions up to and including expulsion from the university.

Recording Lectures
Students may, without prior notice, record video or audio of a class lecture for a class in which the student is enrolled for their own personal educational use. Recordings may not be used as a substitute for class participation or class attendance. Recordings may not be published or shared in any way, either intentionally or accidentally, without the written consent of the faculty member. Failure to adhere to these requirements is a violation of state law (subject to civil penalty) and the student code of conduct (subject to disciplinary action). *Recording class activities including, but not limited to, lab sessions, student presentations (whether individually or part of a group), class discussion (except when incidental to and incorporated within a class lecture), and invited guest speakers is* ***prohibited****.*

Disclaimer: **This syllabus is tentative and may be subject to change. Everything in the syllabus might change except for:**
1) Course description.
2) Textbook(s).
3) Grading policy.

Tentative Schedule*

- The following timetable is tentatively scheduled and subject to change by the instructor.
- Important Dates: https://floridapoly.edu/academics/academic-calendar/index.php

Week 1	Introduction to Software Engineering - Overview of software engineering disciplines - Software development lifecycle models - Traditional vs. agile methodologies - Software engineering challenges (e.g., scalability, maintainability)	Real-world examples of software failures and successes. Class discussion on software engineering trends.
Week 2	Agile-based Software Development - Agile manifesto and values - Scrum framework: roles, artifacts - Pair programming and extreme programming (XP)	Simulated Scrum planning session. Paper discussion on Agile-based development.
Week 3	Requirements Engineering - Techniques for gathering and documenting software requirements - Writing effective user stories and acceptance criteria - Managing changing requirements - Use case modeling as a technique for representing functional requirements	Write user stories for a real-world scenario. Analyze poorly written requirements. Paper discussion on requirements analysis.
Week 4	Modeling and Estimating Software Requirements - Modeling and Estimating Requirements - Function point analysis as a technique for effort estimation	Case study: estimating the resources needed to develop a new e-commerce system.
Week 5	Agile Planning and Estimation - Sprint planning and backlog prioritization - Estimation techniques: story points, planning poker - Monitoring progress: burn-down charts and velocity tracking	Simulate a sprint planning session with a fictional project. Create and analyze a burn-down chart.
Week 6	Design and Architecture - Principles of good software design (SOLID) - Designing scalable and maintainable software systems - Architectural patterns (e.g., microservices, SOA architecture)	Case study: Evaluate the architecture of a popular software system.
Week 7	Design and Prototyping - Design patterns and best practices - Prototyping techniques and tools	Case studies on system design. Paper discussion on design and architecture.

Week 8	Testing and Automation - Testing and quality assurance techniques - Test-driven development (TDD) - Automated testing frameworks	Write unit tests for an application. Write automated tests using JUnit. Exam 1.
Week 9	NO CLASS – Spring Break	
Week 10	Software Metrics and Quality Assurance - Key software metrics (e.g., code complexity, maintainability) - Static vs. dynamic code analysis - Code review - Quality assurance practices in agile	Explore tools (e.g., SonarQube) to analyze code quality. Paper discussion on software quality assurance.
Week 11	Software Maintenance and Evolution - Maintenance types - Refactoring techniques and strategies - Testing and validation in the refactoring process	Refactor a given codebase to improve readability and maintainability. Paper discussion on refactoring.
Week 12	Security in Software Engineering - Secure coding principles (e.g., input validation, encryption) - Threat modeling and vulnerability analysis	Perform threat modeling. Paper discussion on software security.
Week 13	Security in Software Engineering (cont'd) - Application security testing tools - Mobile Application security	Perform a vulnerability scan on a sample application. Paper discussion on software security.
Week 14	State-of-the-art Research in Software Engineering - State-of-the-art advancements in software engineering - Emerging trends (e.g., AI in software development) - Opportunities for research and innovation in the field	Conducting literature reviews and presenting findings. Paper discussion on emerging trends in SE.
Week 15	State-of-the-art Research in Software Engineering (cont'd)	Paper discussion on emerging trends in SE.
Week 16	Project Presentations	

**I reserve the right to modify this schedule as required by the progression of the class.*