CSYE 7230 Software Engineering
Course Syllabus

Course Information
Course Title: CSYE 7230 - Software Engineering
Term and Year: FALL 2023
Credit Hours: 4.0

Instructor Information:
Full Name: Omar Badreddin
NEU Email Address: o.badreldin@northeastern.edu

Restrictions:
Must be enrolled in one of the following Levels: Graduate
Must be enrolled in one of the following Colleges: College of Engineering

Prerequisites:
Graduate level CSYE 6200 Minimum Grade of C-

Course Description:
Looks at the software life cycle (requirements analysis and specification, software design, coding, testing, and maintenance). Offers verification, validation, and documentation at various stages of the life cycle. Covers the Unified Modeling Language as applied to the software life cycle. Covers applications of design patterns. Overviews user interface design, software metrics, and software development environments. Emphasis is on modular software construction and development of modular libraries. Requires a small software development project.

Prereq. CSYE 6200; engineering students only.

Program Learning Outcomes (PLOs):
The main objective of this course is to introduce the students to the discipline of Software Engineering. In particular:
- Identify the problems that one should expect when developing large software systems.
- The methods that the software developer can use to deal with each of the problems.
- The tools that the software developer can use.
- The procedures that can be followed in developing software.

Course Learning Outcomes
The goal of this course is to teach students advanced software design techniques, and expose them to some of the cutting-edge design and modeling tools. Students should gain an understanding of the modeling practices

of software engineers that ranges from model centric to code centric approaches. The students should have an understanding of model driven engineering concepts. Students will have some applied experience in developing sufficiently large systems using model driven methodology. The students will experience researching an advanced topic and write a short report paper.

Based on satisfactory completion of this course, a student should be able to:
CLO1: Understand the process and techniques of designing large software systems
CLO2: Appreciate the challenges involved in the design and development of large software systems
CLO3: Understand ad apply class diagrams, state machines, and SysML modeling notations.
CLO4: Understand and practice the techniques of forward and reverse engineering.
CLO5: Understand and practice automated program generation
CLO6: Understand some of the current research topics in the area of model driven engineering

Course Outline:

Topic	Name	Description
A	Overview of Software Development Processes	Presentation of key software development processes with focus on agile methodologies.
B	UML Review & UML Extension Mechanisms	Introduction of the different modeling notations of UML. An overview of UML profiles and UML extension mechanisms.
C	Advanced UML Modelling	Class and state machine modeling. Presentation of associations, multiplicities, simple and composite state machine models, and related code generation fundamentals, techniques, and tools.
D	OCL	Introduction of the OCL constraints language.
E	SysML	System modeling using SysML.
F	Code and Design Smells	Discussion of various coding styles, code smells, design smells, practices and tools for evaluating code quality and complexity.
G	Program Refactoring and Comprehension	Introduction to refactoring and program comprehension techniques, software maintenance and analysis.
H	Technical Debt	Introduction and discussion of Technical Debt concepts and implications, and quantification methods.
I	Software Configuration Management	Discussion of the fundamental practice of Software Configuration Management, best practices, tools, and techniques, defect and feature tracking, various types of code repositories, code promotion processes, change management, version management, and release management.
J	Blockchain Fundamentals and Development Platforms	Introduction to Blockchain fundamentals. Overview of some key open source blockchain development platforms.
K	Software Testing Fundamentals	Introduction to software testing, test coverage, graph based coverage, logic coverage, syntax based testing, test methodologies, and performance and usability testing.
L	Selected Topic	A coverage a contemporary topic of relevance to the course. This could include presentations by students.

Policy on late work: late submissions of course work will not be graded or considered without a documented and approved excuse.

Grade Breakdown:

Assignments (~ 6 assignments)	35%
Term project Presentation	20%
Term Project Report	15%
Final Exam (comprehensive)	30%
Attendance required	0%

Grading: Graduate Programs Final Grading Scale

95-100%	A	87-89.9%	B+	77-79.9%	C+	69.9% or below	F
		84-86.9%	B	74-76.9%	C		
90-94.9%	A-	80-83.9%	B-	70-73.9%	C-		

Academic Integrity:
A commitment to the principles of academic integrity is essential to the mission of Northeastern University. The promotion of independent and original scholarship ensures that students derive the most from their educational experience and their pursuit of knowledge. Academic dishonesty violates the most fundamental values of an intellectual community and undermines the achievements of the entire University.

As members of the academic community, students must become familiar with their rights and responsibilities. In each course, they are responsible for knowing the requirements and restrictions regarding research and writing, examinations of whatever kind, collaborative work, the use of study aids, the appropriateness of assistance, and other issues. Students are responsible for learning the conventions of documentation and acknowledgment of sources in their fields. Northeastern University expects students to complete all examinations, tests, papers, creative projects, and assignments of any kind according to the highest ethical standards, as set forth either explicitly or implicitly in this Code or by the direction of instructors.

Go to http://www.northeastern.edu/osccr/academic-integrity-policy/ to access the full academic integrity policy.

CPS expects independent and original work. Dishonesty and/or carelessness violates fundamental values of an intellectual and professional community and will be reported to the Office of Student Conduct and Conflict Resolution (OSCCR) as a violation of the Academic Integrity Policy. To safeguard the integrity of assignments and programs, your course may use systems such as TurnItIn, which checks written work, and Examity, an online exam proctoring system. Work that contains academic integrity violations (AIV) will be graded on a case by case basis. Work displaying AIV may earn a failing grade, a zero, or even result in the instructor assigning the student a failing grade for the class. Students may not withdraw from a class to avoid the grade penalty for serious academic integrity violations.

For additional information or for answers to frequently asked questions, please visit:

https://cps.northeastern.edu/academic-resources/academic-integrity

You may also email CPS-AcademicIntegrity@northeastern.edu.

Student Accommodations:
The College is committed to providing equitable access to learning opportunities to students with documented disabilities (e.g. mental health, attentional, learning, chronic health, sensory, or physical). To ensure access to this class, and program, please contact The Disability Resource Center   (http://www.northeastern.edu/drc/) to engage in a confidential conversation about the process for requesting reasonable accommodations in the classroom and clinical or lab settings. Accommodations are not provided retroactively so students are encouraged to register with the Disability Resource Center (DRC) as soon as they begin their program. The College of Professional Studies encourages students to access all resources available through the DRC for consistent support.

Student Well-Being:
All students have access to We Care – 617-373-7591   wecare@northeastern.edu for health concerns, referrals for mental health and assistance with leaves of absence. Additionally we have FIND@ Northeastern - Available 24/7/365   1-877-233-9477 (domestic)   1-781-457-7777 (international)
https://www.northeastern.edu/uhcs/find-at-northeastern/

Library Services:
The Northeastern University Library is at the hub of campus intellectual life. Resources include over 900,000 print volumes, 206,500 e-books, and 70,225 electronic journals. For more information, visit http://library.northeastern.edu/.

Wyzant Tutoring Services:
Northeastern University's College of Professional Studies is covering the cost of twenty-five hours per academic year of tutoring from Wyzant to help ensure your success in challenging courses. Tutors on Wyzant have helped thousands of students in 300+ subjects ranging from College Algebra to Academic Writing, Statistical Analysis to Microbiology.To access your free Wyzant Tutoring for students in the College of Professional Studies, please complete the following steps:

- Login to Northeastern University's **Canvas** platform and click on your active course.
- Once you are logged in your class, scroll to the bottom red link on the left side of the course navigation that says "Wyzant Tutoring".
- After clicking this link, you will be prompted to access your free tutoring using your Northeastern login credentials. Indicate your program, time zone, the course you'd like support in, and the specific topics or materials you'd like help with.
- You'll receive an activation email from Wyzant for Higher Ed. (If you don't see it, check your spam or junk folders.) From the email, click on the activation button.
- Potential tutors will begin reaching out to you. Their messages will be sent to your Northeastern email inbox and will be accessible via your Wyzant account dashboard.
- Respond back to the tutors you believe might be a good fit to schedule an online session when it's convenient for you — even late at night!

24/7 Canvas Technical Help:
For immediate technical support for Canvas, call 1-833-450-3937. You can chat and report an issue to Canvas technical support right from within Canvas through the Help icon located in the Canvas global navigation.

myNortheastern, e-mail, and basic technical support
Visit the Information Technology Services (ITS) Support Portal
Email: help@northeastern.edu
ITS Customer Service Desk: 617-373-4357 (help)

Diversity and Inclusion:
Northeastern University and the and the Office of Institutional Diversity and Inclusion (OIDI) is committed to equal opportunity, affirmative action, diversity and social justice while building a climate of inclusion on and beyond campus. In the classroom, member of the University community work to cultivate an inclusive environment that denounces discrimination through innovation, collaboration and an awareness of global perspectives on social justice.

Please visit http://www.northeastern.edu/oidi/ for complete information on Diversity and Inclusion.

TITLE IX:
Title IX of the Education Amendments of 1972 protects individuals from sex or gender-based discrimination, including discrimination based on gender-identity, in educational programs and activities that receive federal financial assistance.

Northeastern's Title IX Policy prohibits sex and gender-based discrimination, including sexual harassment, sexual assault, sexual exploitation, relationship or domestic violence, and stalking. The Title IX Policy refers

to sex and gender-based discrimination as "Prohibited Offenses." The Title IX Policy applies to the entire Northeastern community, including students, faculty and staff of all gender identities.

Allegations of Prohibited Offenses can be reported to the Title IX Coordinator within The Office for University Equity and Compliance at: titleix@northeastern.edu and/or through the Northeastern University Police Department (NUPD) by phone: for an Emergency 617.373.3333; for Non-Emergency 617.373.2121. Reporting to NUPD does NOT commit the victim/affected party to future legal action.

Faculty members are considered "responsible employees at Northeastern University, meaning they are required to report all reports of and information about alleged Prohibited Offenses to the Office for University Equity and Compliance.

If you or someone you know has experienced a Prohibited Offense, confidential support and guidance can be found through (https://www.northeastern.edu/ouec/resources/main-campus-resources/), University Health and Counseling Services (UHCS) staff (http://www.northeastern.edu/uhcs/) and the Center for Spiritual Dialogue and Service (CSDS) clergy members (http://www.northeastern.edu/spirituallife/). Employees within the VRC, UHCS, and CSDS are not required to report allegations of Prohibited Offenses to the Office for University Equity and Compliance.

In case of an emergency, please call 911 OR NUPD'S Emergency line: 617-373-3333.

Please visit www.northeastern.edu/titleix for a complete list of reporting options and resources, both on- and off-campus.

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