CSYE 7374: Design Patterns

Course Information
Course Title: Design Patterns
Course Number:CSYE 7374
Term and Year: Summer 2025
Credit Hour: 4
CRN: 50632
Course Format: On-Line

Instructor Information
Full Name: Daniel G. Peters
Email Address: d.peters@northeastern.edu
Office Hours: 3:30-5:30pm Tuesday via Zoom by appointment

Instructor Biography
Daniel Peters holds several U.S. Patents from almost 40 years computer industry hardwre, firmware, softwre and system design experience experience including real-time embedded, operating systems, device drivers, middleware, distributed applications, telecommunications, networking, cryptography, C, C++, C# and Java.

Teaching Assistant Information
Full Name: Mridula Probhakar
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Office Hours:TBA

Course Prerequisites
N/A
Course Description
Introduces Design Patterns: Building Blocks of the Best Software Architectures and Designs via the Java programming language. Use Factory and Command Patterns for abstraction over object creation and execution and thereby design and write loosely coupled software that is extensible, maintainable and cost effective. Employ the Decorator Pattern to design and write software that can be dynamically constructed without recompilation. As industry standard best practice, each design pattern is studied to show how it solves a real-world problem with a proven, well established and well-known solution. Students will learn from a pragmatic teach-by-example/learn-to-do methodology. Lectures are specifically designed with Java code examples so students can master fundamental concepts while developing their own critical skills in a demystifying and easy to absorb format. As each student incorporate design patterns into their software, they will learn invaluable design concepts and methodologies used in modern software architecture and design. Concepts like Abstraction for Functionality Hiding, Loose Coupling for design extensibility and S.O.L.I.D. design principles are all characteristic of the very best software architectures and designs. Elegant and pragmatic: these key concepts simplify software, allow for its reuse and reduces software development cost. Upon successful completion students will be prepared to master the interview and produce on the job. Applicable to any object-oriented language, this course will teach the student implementations in Java with references to C++ and C#. This course will teach object-oriented software design patterns from the design process through its application and implementation in modern object-oriented software. Requires a course project. Requires knowledge of Java programming.

Course Learning Outcomes
1) Apply Object-Oriented Design Principles: Students will be proficient in applying object-oriented design principles using the Java programming language, as well as a honed competency in utilizing inheritance, composition, and interface classes to design robust software solutions.
2) Implement Design Patterns and Principles: Students will implement design patterns in Java programming to enhance code maintainability, extensibility, and reusability.
3) Utilize Advanced Java Features for Software Development: Students will be proficient in leveraging advanced Java features for software development, such as JavaSwing, and possess skills in GUI programming.

Required Tools and Course Textbooks.
Java SE JDK 22, Eclipse, IntelliJ, Netbeans or Visual Studio Code Integrated Development Environment (IDE) or equivalent instructor approved IDE

Course Schedule/Topics Covered.

Week	Date	In Class Topic	Assignment Due
1	05/06	Introduction	Java IDE Laptop installation
2	05/13	API & Object Oriented Principles	Stock
3	05/20	Singleton, Factory & Builder patterns	Stock Factory
4	05/27	Strategy and Flyweight patterns	Stock Strategy
5	6/3	Adapter & Decorator patterns	Adapter

6	6/10	Composite patterns	Auto
7	6/17	Bridge pattern	n/a
8	6/24	Mid-term exam	Optional Mid-term take home assignment
9	7/1	Prototype pattern	Prototype Lab
10	7/8	Command pattern	Command Pattern Lab
11	7/15	Template Method & State patterns	Store State API
12	7/22	Façade pattern	Façade Assignment
13	7/29	Observer pattern	n/a
14	8/4	Final exam	Final Project
15	8/11	Final Project Presentation	n/a
16	8/18	n/a	n/a

Assignment Grading

Attendance and Participation: 10%

Assignments, Quizzes, Project and Labs: 40%

Mid-term Exam: 25%

Final Exam: 25%

Grading Scale

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

Attendance/Late Work Policy

Attendance Policy

Students registered in MGEN courses (INFO, CSYE, and DAMG) are allowed **a maximum of 2 absences per course, with 3 or more absences resulting in an automatic 'F' for that course.** Students are expected to inform their instructors of any absences in advance of the class; if a student is sick long-term or experiences a medical issue that prevents class attendance, it is strongly encouraged that they speak with their Academic Advisor (coe-mgen-gradadvising@northeastern.edu) to learn more about the Medical Leave of Absence. Should a student anticipate being unable to attend 3 or more classes, they should discuss their situation with their Academic Advisor to explore other types of leave in accordance with the

University's academic and global entry expectations. International students should review the Office of Global Services webpage to understand their visa compliance requirements.

Teaching Assistants (TAs) or Instructional Assistants (IAs) will be present at each class to collect student attendance.

Late Work Policy

Students must submit assignments by the deadline in the time zone noted in the syllabus. Students must communicate with the faculty prior to the deadline if they anticipate work will be submitted late. Work submitted late without prior communication with faculty will not be graded.

End-of-Course Evaluation Surveys
Your feedback regarding your educational experience in this class is particularly important to the College of Engineering. Your comments will make a difference in the future planning and presentation of our curriculum.

At the end of this course, please take the time to complete the evaluation survey at **https://neu.evaluationkit.com**. Your survey responses are **completely anonymous and confidential**. For courses 6 weeks in length or shorter, surveys will be open one week prior to the end of the courses; for courses greater than 6 weeks in length, surveys will be open for two weeks. An email will be sent to your Northeastern University Mail account notifying you when surveys are available.

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.

MGEN Student Feedback
Students who would like to provide the MGEN unit with anonymous feedback on this particular course, Teaching Assistants, Instructional Assistants, professors, or to provide general feedback regarding their program, may do so using this survey: https://neu.co1.qualtrics.com/jfe/form/SV_cTIAbH7ZRaaw0Ki

University Health and Counseling Services

As a student enrolled in this course, you are fully responsible for assignments, work, and course materials as outlined in this syllabus and in the classroom. Over the course of the semester if you experience any health issues, please contact UHCS.

For more information, visit https://www.northeastern.edu/uhcs.

Student Accommodations
Northeastern University and the Disability Resource Center (DRC) are committed to providing disability services that enable students who qualify under Section 504 of the Rehabilitation Act and the Americans with Disabilities Act Amendments Act (ADAAA) to participate fully in the activities of the university. To receive accommodations through the DRC, students must provide appropriate documentation that demonstrates a current substantially limiting disability.

For more information, visit https://drc.sites.northeastern.edu.

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 and for education specific resources, visit https://library.northeastern.edu
Network Campus Library Services: Northeastern University Library Global Campus Portals

24/7 Canvas Technical Help
For immediate technical support for Canvas, call 617-373-4357 or email help@northeastern.edu

Canvas Student Resources: https://canvas.northeastern.edu/student-resources/

For assistance with my Northeastern e-mail, and basic technical support:
Visit ITS at https://its.northeastern.edu
Email: help@northeastern.edu
ITS Customer Service Desk: 617-373-4357

Diversity and Inclusion
Northeastern University is committed to equal opportunity, affirmative action, diversity, and social justice while building a climate of inclusion on and beyond campus. In the classroom, members 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 Prohibited Offenses, which are defined as sexual harassment, sexual assault, relationship or domestic violence, and stalking. The Title IX Policy applies to the entire community, including male, female, transgender students, faculty, and staff.

In case of an emergency, please call 911.

*Please visit **https://www.northeastern.edu/ouec** for a complete list of reporting options and resources both on- and off-campus.*