Boston University Metropolitan College

Software Design and Patterns

Spring 2022 – MET CS-665
Learn from Anywhere Course Format, Offered Simultaneously On Campus and Remote

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Office hours: by appointment

Meets Thursdays at 6:00PM – 8:45PM EST (Starting on 1/20)

Course Description

This course is an introduction to software design and patterns. You will learn about general software development principles and software design patterns. A design pattern is a general reusable solution to a commonly occurring problem within a given context in software design. Patterns are formalized best practices that the programmers should implement in the applications. This course covers the most common object-oriented software design patterns. For each pattern, it will discuss the underlying object-oriented design principle it is based on; the specific object-oriented design problem it solves; the context it can be applied and the consequences of applying it; how the different components of the pattern collaborate with each other.

Recommended Books

The following books are recommended, but are not required.

Eric, J. Braude. (2003). *Software Design: From Programming to Architecture.* Publisher: Wiley
ISBN-13: 978-0471204596 ISBN-10:
0471204595
This book can be purchased from Barnes and Noble at Boston University.

Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides, Grady Booch. (1994). *Design Patterns: Elements of Reusable Object-Oriented Software.* Publisher: Addison-Wesley
Professional
ISBN-13: 978-0201633610
ISBN-10: 0201633612
This book can be purchased from Barnes and Noble at Boston University

Eric Freeman, Elisabeth Robson, Bert Bates, Kathy Sierra. (2004). *Head First Design Patterns*.
Publisher: O'Reilly
ISBN-13: 978-0596007126 ISBN-10:
0596007124
This book can be purchased from Barnes and Noble at Boston University.

Robert C. Martin. (2008). Clean Code: *A Handbook of Agile Software Craftsmanship.*
Publisher: Prentice Hall
ISBN-13: 978-0132350884
ISBN-10: 0132350882
This book can be purchased from Barnes and Noble at Boston University.

Courseware

Blackboard site: https://onlinecampus.bu.edu/

Course Prerequisites
Students should have a solid background in object-oriented programming. The following classes are required/recommended:
   • MET CS 341 or MET CS 342 (Data Structures with C++ or Java) is required for understanding the contents of this course.
   • METCS520orMETCS521
   • MET CS 526 (Data Structures and Algorithms) or MET CS 622 Advanced Programming Techniques
   The course emphasizes the object-oriented design pattern concepts independent of
programming language. All examples in class use Java. Students need to know the Java
programming language to implement the homework and project assignments. **Spring 2022**
COVID-19 Policies

Classroom Rotations: [*for courses with rooms that cannot accommodate the all students wanting to meet in-person*] Classrooms on campus have new capacities that follow guidelines issued by state and local health and government authorities related to COVID-19 and physical distancing. Before the beginning of the class, and throughout the semester, I will be reaching out to students who have indicated that they want to attend the classroom in-person. Our classroom hold [] students, and therefore we will have [two] rotations of students that come to class on campus alternate weeks. You will be asked to attend remotely on the week that you have rotated out the classroom.

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Compliance: All students returning to campus will be required, through a digital agreement, to commit to a set of Health Commitments and Expectations including face coverings, symptom attestation, testing, contact tracing, quarantine, and isolation. The agreement makes clear that compliance is a condition of being a member of our on-campus community.
You have a critical role to play in minimizing transmission of COVID-19 within the University community, so the University is requiring that you make your own health and safety commitments. Additionally, if you will be attending this class in person, you will be asked to show your Healthway badge on your mobile device to the instructor in the classroom prior to starting class, and wear your face mask over your mouth and nose at all times. If you do not comply with these rules you will be asked to leave the classroom. If you refuse to leave the class, the instructor will inform the class that they will not proceed with instruction until you leave the room. If you still refuse to leave the room, the instructor will dismiss the class and will contact the academic Dean's office for follow up.

Boston University is committed to offering the best learning environment for you, but to succeed, we need your help. We all must be responsible and respectful. If you do not want to follow these guidelines, you must participate in class remotely, so that you do not put your classmates or others at undue risk. We are counting on all members of our community to be courteous and collegial, whether they are with classmates and colleagues on campus, in the classroom, or engaging with us remotely, as we work together this fall semester.

Class Policies
1. **Attendance & Absences** – I will not be taking attendance. It is the student's responsibility to keep up with the material covered in class.
2. **Assignment Completion & Late Work** – Late work will not be accepted. We recognize that emergencies occur in professional and personal lives. If one occurs that prevents your completion of homework by a deadline, please make your instructor aware as soon as possible. This must be done in advance of the deadline (unless the emergency makes this impossible, of course), and should be accompanied by particulars that back it up. Additional documentation may be requested. Late submissions without reasons will result in grade deduction: we want to be fair to everyone in this process, including the vast majority of you who sacrifice so much to submit your homework on time in this demanding schedule.
3. **Academic Conduct Code** – Please use the following wording, or an equivalent, in your syllabus: "Cheating and plagiarism will not be tolerated in any Metropolitan College course. They will result in no credit for the assignment or examination and may lead to disciplinary actions. Please take the time to review the Student Academic Conduct Code:

http://www.bu.edu/met/metropolitan_college_people/student/resources/conduct/code.html.

NOTE: [This should not be understood as a discouragement for discussing the material or your particular approach to a problem with other students in the class. On the contrary – you should share your thoughts, questions and solutions. Naturally, if you choose to work in a group, you will be expected to come up with more than one and highly original solutions rather than the same mistakes.]

Grading Criteria

The grading percentages for the course is determined by the following:

Assignments	30%
Weekly Quizzes	20%
Final Class Project	20%
Final Exam	30%

Translation between letter grades and percentages:

A (Excellent)	95-100
A- (Excellent; minor improvement evident)	90-94.99
B+ (Very good)	87-89.99
B (Good)	83–86.99
B- (Good mostly some significant improvements needed)	80-82.99
C+ (Satisfactory; some significant improvements needed)	77-79.99
C (Satisfactory; significant improvements needed)	73-76.99
C- (Satisfactory; significant improvements required)	70-72.99
D Many improvements required	65-69.99
Fail	0-64.99

Graded Items

- Assignments: There are a total of 6 assignments. Assignments are software design and implementation assignments using UML diagrams and Java programming languages.
- We will also use some additional tools and frameworks like Apache Maven, Findbugs, CheckStyle, and JUnit. You will learn about these tools in this course.
- You can access and submit the assignment in the "Assignments" area.
- Final Class Project: The Final Class Project is similar to the assignments, but the topic is open and you can develop your own ideas.

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- One part of the final project is to present your final project.
- Submission direction: Access and submit the Final Class Project in the "Assignments" area.
- Quizzes: Quizzes are designed to assess your understanding of the material, on a module-by-module basis. There is one graded quiz in each of the six modules.
  Quiz taking direction:
    o The results for your quiz will be released as soon as possible after the quiz closes. When the quiz results are released, you will be able to see the questions, your answers, and the correct answers
    o Access and take the quiz in the "Assessments" area.

Class Meetings, Lectures & Assignments
List in a legible format all of the class meetings, lectures, and assignments. One example, based on a computer science course:

Lectures, Readings, and Assignments subject to change, and will be announced in class as applicable within a reasonable time frame.

Date	Topic	Readings Due	Assignments Due
January 20 (week 0)	Introduction and Design Principles Unified Modeling Language (UML) Class Diagram, Sequence, Use Case, State	Module 1 online content	
January 27 (week 1)	Introduction to Design Patterns Strategy Pattern Observer Pattern	Module 1 online content	Quiz 1 due at 6:00 PM ET
February 3 (week 2)	Factory Method Abstract Factory	Module 2 online content	

February 10 (week 3)	Singleton Decorator	Module 2 online content	Assignment 1 due at 6:00 PM ET Quiz 2 due at 6:00 PM ET

February 17 (week 4)	Pattern Categories Façade Pattern State Pattern	Module 3 online content	
February 24 (week 5)	Adapter Pattern Proxy Pattern	Module 3 online content	Assignment 2 due at 6:00 PM ET Quiz 3 due at 6:00 PM ET
March 3 (week 6)	Composite Pattern Command Pattern Mediator Pattern	Module 4 online content	
March 10 (week 7)	Architecture and Frameworks	Module 4 online content	Assignment 3 due at 6:00 PM ET
March 17 (week 8)	Visitor Pattern Template Pattern	Module 5 online content	Quiz 4 due at 6:00 PM ET
March 24 (week 9)	Refactoring 1	Module 5 online content	Assignment 4 due 6:00 PM ET
March 31 (week 10)	Refactoring 2	Module 6 online content	Assignment 5 due at 6:00 PM ET Quiz 5 due

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			at 6:00 PM ET
April 7 (week 11)	JUnit Testing and TDD	Module 6 online content	
April 14 (week 12)	MVC		Quiz 6 due at 6:00 PM ET
April 21 (week 13)	Review		Assignment 6 due 6:00 PM ET
April 28 (No Class)			
May 5 (week 14)	Presentations		Project due at 6:00 PM ET
May 12 (week 15)	Final Exam		