SWE 619 Course Syllabus

Object-Oriented Software Specification and Construction
Fall 2024

Professor: **Wes Masri**
Office: Nguyen Engineering Building 4709
Email: wmasri@gmu.edu

Class Meeting: Tuesday 4:30pm – 7:10pm – James Buchanan Hall D023
Format: In-person.
Prerequisite: SWE Foundation Courses or equivalent.
Office Hours:
GTA
GTA Office hours: TBD

Course Description

To give the students a solid understanding of modern software construction. To encourage the construction of software systems of high quality. Topics covered will be specifications, modular design, design principles, design patterns, refactoring, abstraction techniques, typing, access control, inheritance, and polymorphism. Students will learn the proper engineering use of techniques such as information hiding, classes, objects, inheritance, and exception handling. This section of SWE 619 uses Java to illustrate the covered concepts (the use of additional languages is encouraged, e.g., Python, JavaScript etc.).

Course Materials

- Joshua Bloch. *Effective Java*. **Third Edition.** Addison-Wesley Professional, 2017, ISBN 978-0-13-468599-1. **Required**.
  Direct Safari Link
  General Safari Link (off campus)
- Barbara Liskov with John Guttag. *Program Development in Java*. Addison Wesley, 2001, ISBN 0-201-65768-6. **Required**.
  Direct Safari Link
  General Safari Link (off campus)
- Cay Horstmann. Core Java Vol. I – Fundamentals. Prentice-Hall, 10th edition or later. **Recommended**.

Note on the course materials: We'll start with Liskov. Don't worry about the publication date; Liskov's book ages remarkably well. We're interested in contracts, mutability, data abstraction, and type abstraction. Bloch is concerned about the same things, but explores them in more detail

and in more up-to-date Java. Bloch also corrects some important points that weren't well understood when Liskov's text came out.

Course Outcomes

- Demonstrate ability to specify and analyze stand-alone procedures and OO classes.
- Demonstrate ability to specify and analyze OO inheritance decisions.
- Demonstrate ability to convert mutable data types to immutable data types and vice versa.
- Demonstrate ability to correctly create and destroy OO objects.
- Demonstrate ability to apply good design practices that improve maintainability.
- Demonstrate ability to refactor code in order to improve maintainability.
- Demonstrate ability to write effective unit tests.
- Demonstrate understanding and competence in generic programing.

Weekly schedule

This class is a group-based, in-person offering. That means you need to be present in class at class time. You will also need to meet with your group outside of class. Although your group is free to meet in person, most groups will probably find it more convenient to meet online.

Each week will cover a small number of related technical issues or "topic". Each topic will follow roughly the same sequence of preparation: assigned reading, group-based in-class exercises, group-based homework and (possibly) presentation, and individual quizzes. The quizzes (individual) and homework (group-based) will be graded. The breakdown is:

- Complete assigned readings. Discuss with your group in-person or online.
- In-person Class Meeting: Lectures/discussions on the day's topic, followed by in-class group-based exercises.
- Homework - due the following week.
    - Group-based.
    - Solutions may be briefly discussed prior to the quiz. A randomly selected group presents, or possibly the instructor.
- Beginning of class:
    - The homework related to the topic of the prior week is discussed.
    - Assessment via quiz - takes place right after discussing the homework solution.

Grading

- Weekly Homework Assignments (group-based): 15%
- Weekly Quizzes (individual): 70%
- Group Functioning/Peer-Evaluation: 10%
- Attendance: 5%

Each of these grade components is discussed below.

Group Functioning

Every student needs to be part of a group (3 to 5 students)

Groups will be created randomly, then adjusted based on knowledge of languages other than Java.

At the end of the semester, each individual will provide an assessment of the rest of their group (peer evaluation). This assessment will determine the "Group Functioning" part of the grade.

Groups can communicate internally through any mechanism they choose: zoom, discord, google docs, whatever.

Reading Assignments: The reading assignments must be completed individually then discussed amongst your group before class meeting. This will help in the upcoming homework assignment and class exercises.

Homework Assignments

There are weekly **group** homework assignments, posted and to be submitted via Blackboard.

Because of the way in which this class is taught, it is important to stay on pace. Homework assignments are due before class. Late submissions are not accepted except in truly exceptional circumstances.

Important: Each group should be prepared to present their homework solution in class.

Important: Only one submission per **group**. Please! Everyone in the group gets the same credit.

Important: Every homework submission must include a statement of who did what. Homeworks that do not include such a statement will not be graded.

Weekly Quizzes

- Each quiz happens during the first hour of class and lasts for 15 to 25 minutes.
- No make-ups are allowed. However, the two quizzes with the lowest grade will be dropped (which might include missed quizzes).

Class Attendance

It's important to be in class, and it's important to work with your group. Missing a class/quiz will cost you ~5% of your course grade.

In-Class Exercises

I plan in-class exercises for every class. These are group activities. If possible, you should complete these exercises with your designated group. Some of these exercises need a Java development environment (installing the JDK might suffice). Very often, the in-class exercises will be closely related to an upcoming homework assignment.

In-class exercises are not collected or graded. If you have questions about the in-class exercises, post your questions to Piazza.

Email

Please note that questions of general interest should not be emailed to me. Post on Piazza instead.

Virginia Privacy Laws

The state of Virginia now has laws that require the University (including me) not to disclose student email addresses, phone numbers, and addresses. This will impact communications in this class as follows:

- Communicating via email with groups of students is problematic. (Bcc is a partial but not very good, solution.) As far as I have been able to determine, Piazza does not make student emails visible to other students, even though instructors can see email addresses. Hence, this is another reason to favor the Piazza forum.
- **You** can choose to disclose your email whenever and wherever you wish. That's up to you.

Piazza

We'll use Piazza for discussions. I will add students who are enrolled on Patriot Web to the Piazza page for this class. (Self sign-up is disabled; we've had problems with that in the past.)

I find anonymous discussions unhelpful in this class; here learning is predicated on interactions. Plus, part of your education is to learn to stand behind your questions and ideas. That's how employees function in the working world. Piazza allows partial, but not complete, control of anonymous posts. Should someone post anonymously, I will ask the poster to change the visibility and ask the class not to respond to the anonymous version.

Honor Code

As with all GMU courses, SWE 619 is governed by the GMU Honor Code.

In this course, every quiz carries with it an implicit statement that it is the sole work of the author. The final exam carries with it an explicit statement that it is the sole work of the author.

Learning Disabilities

Students with learning disabilities (or other conditions documented with GMU Office of Disability Services) who need academic accommodations should see me and contact the Disability Resource Center (DRC) at (703)993-2474. I am more than happy to assist you, but all academic accommodations must be arranged through the DRC.

Contact note:

I will use BB's "Announcement" feature to contact you. If you want to schedule an appointment, contact me by email.