SENG 6245: Software Construction
Spring 2022

Instructor	Dr. Mark Hills
Scheduled Class Time	Tuesday and Thursday, 2:00pm to 3:15pm Class meets in Austin 205 or online.
Instructor Office	Science & Technology Building, Room C-110
Office Hours	Tuesday 3:30pm to 5:00pm Wednesday 1:00pm to 3:00pm Thursday 3:30pm to 5:00pm Feel free to make an appointment with me if you need to meet outside of these hours. I will be available on MS Teams during these times and will also be in my office if you want to meet in person.
Instructor Phone	252-328-9692
Instructor Email	hillsma@ecu.edu, responses within 24 hours during the week, potentially longer during holidays or weekends
Course Web Page	Canvas: https://canvas.ecu.edu
Required Textbooks	None (see below)

Course Description and Objectives

The catalog description for this course is as follows:

> *Application of software specifications, design patterns, object-oriented design and concurrent programming, and testing techniques for designing, constructing, and testing large-scale software systems.*

The course teaches software construction concepts including object-oriented programming, configuration management, and the use of automated unit testing, build, and program analysis tools. The course discusses and illustrates concepts such as modularization, specification, information hiding, concurrency, abstraction, generics, design patterns, and unit testing. The purpose of this course is to give students a solid understanding of modern software construction, and to prepare students to construct high quality programs.

After taking this course, you should be able to:

- develop software using sound software development principles, tools, and techniques;
- create object-oriented systems that make effective use of abstraction and specification concepts, including the use of appropriate interfaces, classes, and methods, and the effective use of concepts such as concurrency, generics, inheritance, and polymorphism;
- understand basic concepts of automated software testing, and perform automated software testing using unit testing and test coverage tools;

- use developer tools for tasks such as build automation, continuous integration, style checking, and program analysis.

Although these concepts are covered mainly in the context of Java, they apply to most modern programming languages and software systems.

Prerequisites

The prerequisite for this course is SENG 6230 or the consent of the instructor. You are expected to be familiar with Java at the level of a student that has successfully completed the material typically covered in an introductory computer science sequence, such as the material in SENG 5000. If you are familiar with a similar language, especially C#, adapting to Java should be fairly straight-forward. If you are not familiar with Java, please read, and go through the exercises in, Schildt's "Java: A Beginner's Guide". You should also look at material available through learning resources such as LinkedIn Learning (free for ECU students) and sites like Coursera. If you do not have any programming experience, you must take SENG 5000 before taking this course, this is **not** an introductory programming course. If you ignore this prerequisite, you should not expect to do well in this class.

Classroom Meetings

NOTE: This language was provided by ECU, and has only been modified to update the semester.

As stated in ECU's Community Expectations, by working together, we can keep Pirate Nation safe for a successful Spring 2022 semester. Therefore, we will be observing the following class policies related to your health and safety:

- All students are required to comply with the University Regulation on Face Coverings. No student will be allowed into the classroom without a face covering or mask worn properly over both the mouth and nose. You must wear a face covering properly the entire time you are in class.
- If you do not have access to a face covering, you may obtain a mask from Dowdy Student Store, Pirate Pantry, or another provider of masks.
- Maintain appropriate social distancing in hallways or common spaces prior to and after class, and stay spaced as much as possible in the classroom.
- Follow all posted signage related to entry, exit and pedestrian flow within classroom buildings.
- Conduct a daily health screening using the CDC's COVID-19 symptoms list. Do NOT attend class if you answer yes to any item on the list or if you are experiencing symptoms of any illness.

In the case of localized outbreaks affecting our classroom identified by health officials, we will transition to online delivery for up to two weeks for your safety. Health officials will closely monitor conditions and may need to contact you by phone to help them monitor public health conditions. Please ensure your phone number is up to date in PiratePort. After this period of up to two weeks, we will resume on campus in-class activities. The temporary move to online course delivery will not affect the due dates for exams, quizzes, assignments, or any other form of assessment. If the course schedule requires adjustment, I will always notify you.

If the course moves online, you may be required to attend synchronous class meetings at the established class times via our existing Teams team for the course. Class meetings will be recorded for students who have poor internet connections.

I will post all course materials and class meeting recordings, if available, on Canvas. Students unable to attend should access those notes and materials and contact me if they have any questions. The Canvas course will be used for all communications, assignments, and assessments. It is recommended you save on your computer and/or print a copy of the syllabus, assignment schedule, and other important course material. In the event of a Canvas outage, I will use email to communicate with you.

Official Statement on Course Recordings: This class will be recorded and broadcast on the internet and/or distributed on other electronic media now or hereafter known. These recordings may contain your image and your voice. You must notify me as soon as possible if you DO NOT want your image and your voice contained on the recording. If you do not so timely notify me, then you understand and authorize that as part of this class we may record your image and record your voice and broadcast it on the internet and/or distribute it on other electronic media now or hereafter known.

Instructor's Explanation/Addendum: The language above is language we have been asked to use. Essentially, if we record the course, you may be on video. Most likely, this would only include audio of your voice, since we would mainly be focused on recording the lecture itself, not the entire classroom, but if we have a discussion or you ask a question, the audio from this may be captured. The video will only be available to other members of the course. Each classroom session will be recorded.

Textbooks

There are three textbooks for the course, one recommended and two optional.

The recommended textbook is *Program Development in Java: Abstraction, Specification, and Object-Oriented Design*, by Barbara Ryder and John Guttag. This book has ISBN 9780201657685, and should be available through Amazon.com, the ECU campus bookstore, and other booksellers. You can also access this book using the Safari online book service, which is available for free if you are an ACM professional member, and for an additional fee if you are an ACM student member. This book covers an older version of Java, so we will discuss how newer features in the language impact the examples in the textbook.

The optional textbooks are

- *Java: A Beginner's Guide*, 8th edition, by Herbert Schildt. This book has ISBN 9781260440218, and should be available through Amazon.com, the ECU campus bookstore, and other booksellers. You can also access this book using the Safari online book service, which is available for free if you are an ACM member. I will occasionally reference a chapter from this book as material that would be useful for you to review if your knowledge of Java in that area could use some reinforcement.

- *Effective Java*, 3rd edition, by Joshua Bloch. This book has ISBN 9780134685991, and should be available through Amazon.com, the ECU campus bookstore, and other

booksellers. You can also access this book using the Safari online book service, which is available for free if you are an ACM member. We will be discussing specific items from this book in class.

Other helpful material, including references to books, conference or journal articles, tutorials on the web, and videos will be posted as the course progresses. You should read/view these when they are assigned so we can discuss them in class.

Exams

The final exam time for the course is **Wednesday, May 4th**, from **2pm – 4:30pm**. The exam itself will be available on Canvas starting on **Tuesday, May 3rd** and ending on **Wednesday, May 4th** (so, both the day before, and the day of, the official exam time). More details about the exam will be available closer to the exam date. The exam will be an open book exam, with no proctor required. We will review for the exam on the last day of class.

There will not be a midterm exam. Instead, we will have a number of hands-on activities over software construction topics, outside of the normal homework assignments, throughout the semester.

Grading

Students will be evaluated based on a combination of homework assignments, completion of the hands-on activities, the research project/lesson, and the final exam. The following grade cut-offs, using a 100-point scale, will be used:

Grading	
A	≥ 90
B	≥ 80
C	≥ 70
F	< 70

This grade is based on the following relative weights of the various activities:

Weighting	
Homework	40%
Hands-On Activities	20%
Research Project/Lesson	20%
Final Exam	20%

Homework assignments will be due roughly every two weeks. Hands-on activities will be issued periodically throughout the semester. More details about the homework, the hands-on activities, and the research project/lesson will be made available during the course.

Attendance Policy

On-campus students are expected to attend class (international students studying under a student visa are **required** to attend class). Online students are expected to keep up with the lecture videos to

ask timely questions and participate in group chats/discussions of the material, and can also join live during our scheduled class times. You are responsible for announcements given in class or posted to Canvas. If you are an on-campus student and you miss a class, you should watch the related video before the next class. Excuses that you did not know about something because you did not come to class and did not see announcements on Canvas will not be accepted. If you are having trouble understanding the lectures and/or assignments, come to office hours, schedule an appointment, or otherwise ask for help. Get help as early as possible. If you wait until the end of class to seek help, there is most likely very little that you can do to improve your score. Also, an obvious addition: **if you are sick, or believe you may be sick, do not come to class!** Take advantage of the fact that the course is recorded and either attend live on Teams or watch the lecture later.

Starfish

This course may use the Starfish system to provide you with information on your performance within the course. For more information, please see **http://www.ecu.edu/cs-acad/advising/upload/Starfish-Student-Getting-Started.pdf**.

Student Conduct

Smoking is not permitted in classrooms. Please turn off mobile phones in class. Laptops and tablets can be used for taking notes, but they should not be used for other work (or recreational browsing, playing games, watching Netflix, or other activities not related to class).

Students are expected to abide by the university's Student Honor Code. The homework, including programming assignments, hands-on activities, and the research project/lesson, that you do is a critical part of your education. Each student is expected to do his or her own work, except where teamwork is explicitly allowed or required. That does not mean you are not allowed to discuss your ideas with other students. Working in groups can be beneficial, and I encourage you to talk through ideas with other students. But outright copying, either from other students or from other sources (e.g., textbooks, websites) is plagiarism and is unacceptable. Students who copy other students' work, or who allow their work to be copied, or who copy their work from other sources, such as the internet, are violating the ECU academic integrity policy. Not only that, if you are copying your answers instead of doing the work yourself, you are essentially missing the entire point of this course, which will come back to haunt you when you don't know this material at a future employer.

Other potential academic integrity violations are cheating, falsification, multiple submissions of the same work in different classes, and attempts at any of these violations. Please see http://www.ecu.edu/cs-studentlife/policyhub/academic_integrity.cfm for more details.

Academic integrity violations can result in a grade penalty up to and including an F for the course and a report of the incident to the university. Cheating on an assignment can result in negative credit for the assignment (instead of just a 0, you can lose the same number of points you could have gained legitimately doing the work).

Other Policies

No incompletes will be issued in this course except for extraordinary circumstances, and even then, only if you are nearly done already, and have done work of acceptable quality, so that you have a realistic change to pass the course.

All homework solutions, hands-on activities, and submissions for the research project/lesson, are due by the posted due date and time. Late submissions will not generally be accepted. If for some reason you are not able to complete the assignment on time, you must contact me directly with an explanation and request an extension before the deadline. If something comes up and you are having trouble keeping up with the class, talk to me right away, ***don't wait until the end of the semester!***

Course participation is an important part of the course. If you do not participate, you will make it harder to have the kinds of discussions we need to make the class interesting. Please read any assigned readings or watch assigned videos in a timely fashion, do the homework promptly when it is made available (so you know if you are going to get stuck!), and come to class prepared to talk.

Success in the class is directly correlated with class attendance, so I highly recommend that you attend and actively participate. If for some reason you cannot attend, please let me know – my expectation is that you will watch the lecture online and ask me questions about the material if you have any. For online students, I recommend that you watch the lecture the day it is given and send any questions before the next class session (so I can address them in class). Falling behind will make the course more difficult than it would otherwise be. I will be taking attendance at regular points in the class for my own records.

All code, test scripts, and other software artifacts must be stored in GitHub. I will not accept programming assignments submitted through Canvas or emailed to me. If you have questions about your code, check it in to the related GitHub repository, that way I can easily look at it. Sending screenshots of your code is generally not helpful.

Course materials, including programming assignments and lecture notes, can only be publicly shared or used for commercial purposes if given permission. This is covered by ECU copyright regulations, available at http://www.ecu.edu/prr/10/40/02, which state the following:

> 7.1.3. Notes of classroom and laboratory lectures, syllabi, exercises and other course materials taken by Students shall not be deemed Student Works, may only be used for personal educational purposes, and shall not be used for commercialization by the Student generating such notes or by any third party without the express written permission of the author of such Works. Violation of University Policy may be grounds for disciplinary action pursuant with the ECU Student Conduct Process.

Weather Emergencies

In the event of a weather emergency, information about ECU can be obtained through the following sources:

ECU emergency notices	http://www.ecu.edu/alert

ECU emergency information hotline 252-328-0062

Students with Disabilities

East Carolina University seeks to comply fully with the Americans with Disabilities Act (ADA). Students requesting accommodations based on a disability must be registered with the Department for Disability Support Services located in Slay 138 ((252) 737-1016 (Voice/TTY)).

For more information, please see http://www.ecu.edu/cs-studentlife/dss/.

Caveats

Occasionally, it may be necessary to revise this syllabus due to extenuating circumstances. I reserve the right to revise this syllabus if the need arises. If I do so, I will announce the changes on Blackboard and/or in class.