

# EE 552WS Engineering Programming: Java

Charles V. Schaefer, Jr. School of Engineering & Science

Fall 2021

Instructor: Frank Riccobono

Course Web Address: <https://sit.instructure.com/courses/50579/>

Course Schedule: The course will meet weekly at 7:00 pm EST on Tuesdays

Contact Info: [friccobo@stevens.edu](mailto:friccobo@stevens.edu)

Virtual Office Hours: Thursday evenings from 7:00-8:00 pm EST. Other times available upon request.

Virtual session URL:

- Course Meeting URL: (Available through Canvas. Click Zoom in the lefthand navigation.)
- Office Hours URL: <https://stevens.zoom.us/my/friccobo>
- [\(Links to an external site.\)](#)
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Prerequisite(s): N/A

Corequisite(s): N/A

Cross-listed with: CPE 552

## COURSE DESCRIPTION

This course provides an in-depth view of the Java language, focusing on practical applications to engineering disciplines. We start with Processing, an easy-to-use front-end to Java that provides a friendlier introduction to the structure of the language. You will learn to use Processing to write 2d and 3d graphics and animations while learning how to structure programs. We will then start programming in Java looking at program structure, variables, and constants, elementary data types, arrays, loops, conditional statements, functions, and recursion. We will discuss different programming paradigms within Java including object-oriented programming and functional programming.

## STUDENT LEARNING OUTCOMES

Students will be able to read code and follow the logic, to write loops and recursive functions to achieve the desired algorithm. Students will be able to use a debugger and build object-oriented programs to achieve engineering goals. Students will be able to begin using common Java libraries with wide use in the industry.

After successful completion of this course, students will be able to:

- Draw 2d graphics and animation
- Use variables in all primitive types of Java
- Download course materials in git
- Break programs into functions
- Pass parameters
- Draw 3d graphics in OpenGL (a bit)
- Call functions recursively
- Write Java programs and debug them
- Use an IDE and the debugger
- Use arrays and dynamic memory allocation
- Write object-oriented programs using encapsulation, inheritance, and polymorphism
- Use collections, iterators, and other utility classes
- Submit homework with multiple files using git
- Build engineering simulations including circuits, gravity
- Create automated tests to validate programs
- Use threads to write portable multithreaded code
- Write templated code
- Use exception handling to define what happens when systems fail

## COURSE FORMAT AND STRUCTURE

This course is fully online. To access the course, please visit [stevens.edu/canvas](https://stevens.edu/canvas)  
([Links to an external site.](#))

. For more information about course access or support, contact the Technology Resource and Assistance Center (TRAC) by calling 201-216-5500.

### Course Logistics

This course will be taught through weekly online lectures with readings and other supplemental content posted through Canvas. Lectures will be recorded and made available through Canvas, but students are encouraged to attend the live sessions and

participate. A large part of each lecture will be spent doing live demonstrations. We will make use of a program called IntelliJ to allow students to "come up to the board" and type on my screen. Do not be afraid to make mistakes.

Students should also engage in discussions each week in the online discussion board found in the Canvas course. I will make a discussion thread for the week's material available each Monday. Students should post at least once on each week's topic and respond to each others' posts.

The best way to learn to program is through conscious practice. To that end, this course will require you to complete several short homework assignments each week. Submissions must be provided through GitHub Classroom (see Technology Requirements below for more detail). Assignments will be made available and discussed at the end of each lecture. Unless otherwise specified in the assignment, your submission will be due by 11:59 PM Eastern Standard Time (as used in Hoboken, NJ) the following week. Please note, students living in distant time zones or overseas must comply with this course time and time and due date deadline policy.

In addition to homework assignments, there will be timed quizzes every other week, and one mid-term exam. See below for details on the exam policy for the course.

In lieu of a final exam, students will collaborate in small teams to complete a final project - a complete Java program. Team members will be assigned based on project preference. Several approved projects will be available for you to choose from. These project ideas will be in-depth extensions of some of the exercises you've completed in your weekly homework. Students do have the option to propose their own project idea. Any such proposals must be approved by the instructor. You will have five weeks to complete your final project.

## Instructor's Online Hours

I will be available via email and will respond as soon as I am available (generally within 24-48) hours. For the online discussions, I will check in at least 3 times per week. Keep in mind that it is not possible for me to respond to every single posting every week (nor is it pedagogically appropriate), but I will be sure to respond to a variety of postings and students each week and attempt to assure equality in terms of responses to students. Furthermore, there is a specific discussion forum that you can use to ensure that you have my attention – to ask questions or to call my attention to a particular discussion you are engaged in that you would like me to take a look at. If you feel you are being neglected in any way, please contact me.

## Virtual Office Hours

Virtual Office Hours are a synchronous session on Zoom to discuss questions related to weekly readings and/or assignments. Office hours will be held Thursday evenings from 7:00-8:00 pm EST. Other times available upon request. To connect to the weekly session, go to <https://stevens.zoom.us/my/friccobo>

[\(Links to an external site.\)](#)

## Online Etiquette Guidelines

Your instructor and fellow students wish to foster a safe online learning environment. No matter how different or controversial they may be perceived, all opinions and experiences must be respected in the tolerant spirit of academic discourse. You are encouraged to comment, question, or critique an idea, but you cannot attack an individual. Our differences, some of which are outlined in the University's inclusion statement below, will add richness to this learning experience. Please consider that sarcasm and humor can be misconstrued in online interactions and generate unintended disruptions. Working as a community of learners, we can build a polite and respectful course ambiance. Please read the Netiquette rules for this course:

- Do not dominate any discussion. Give other students the opportunity to join in the discussion.
- Do not use offensive language. Present ideas appropriately.
- Be cautious in using Internet language. For example, do not capitalize all letters since this suggests shouting.
- Avoid using vernacular and/or slang language. This could possibly lead to misinterpretation.
- Keep an “open-mind” and be willing to express even your minority opinion.
- Think and edit before you push the “Send” button.
- Do not hesitate to ask for feedback.

## TENTATIVE COURSE SCHEDULE

This schedule is subject to change. Any changes will be communicated through Canvas Announcements.

Week	Topics	Readings	Assignments
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Week 1	Introduction to Processing, Data Types, and Control Flow (Aug. 30 - Sep. 5)	<a href="#">Readings and Multimedia: Topic 1</a>	<ul style="list-style-type: none"> <li>• Primitives in Binary</li> <li>• Counting Problems (e.g 1-99 odds, 1-99 evens)</li> <li>• Traveling Circles</li> <li>• Summations (integer and float)</li> <li>• Drawing <math>n \times n</math> grids</li> </ul>
Week 2	Functions and Recursion (Sep. 6 - 12)	<a href="#">Readings and Multimedia: Topic 2</a>	<ul style="list-style-type: none"> <li>• Graphing Functions</li> <li>• Sierpinski Triangle</li> <li>• Fibonacci Numbers</li> </ul>
Week 3	Introduction to Classes and Inheritance (Sep. 13- 19)	<a href="#">Readings and Multimedia: Topic 3</a>	<ul style="list-style-type: none"> <li>• Penner's Easing Functions</li> <li>• Racing Cars</li> <li>• Fractions Math</li> </ul>

Week 4	Text Input and Output (Sep. 20- 26)	<a href="#">Readings and Multimedia: Topic 4</a>	<ul style="list-style-type: none"> <li>• Checkers Board with Clicking</li> <li>• Spell Check</li> <li>• rot13 Encode / Decode</li> </ul>
Week 5	Collections and Iterators (Sep. 27 - Oct. 3)	<a href="#">Readings and Multimedia: Topic 5</a>	<ul style="list-style-type: none"> <li>• Build Lists of Integers Function</li> <li>• Word Frequency Table</li> <li>• Text Summarization</li> </ul>
Week 6	Structuring Object-Oriented Programs (Oct. 4 - 10)	<a href="#">Readings and Multimedia: Topic 6</a>	<ul style="list-style-type: none"> <li>• Drawing Polygons</li> <li>• Planetary Bodies</li> <li>• Build a Sound Board</li> </ul>
Week 7	Structuring Object-Oriented Programs (Continued) (Oct. 11-24)	<a href="#">Readings and Multimedia: Topic 7-2</a>	<ul style="list-style-type: none"> <li>• Equals / hashCode / toString</li> <li>• Nutrition Fact Builder</li> <li>• Comparable</li> </ul>

Week 8	Mid-Term Review and Exam (Oct. 25-31)	N/A	N/A
Week 9	Apache Maven, Dependencies and Testing (Nov. 1 - 7)	<a href="#">Readings and Multimedia: Topic 9</a>	<ul style="list-style-type: none"> <li>• Add a Maven Dependence ncy and Running a Project</li> </ul>
Week 10	Reflection and Annotations Processing (Nov. 8-14)	<a href="#">Readings and Multimedia: Topic 10</a>	<ul style="list-style-type: none"> <li>• Inspect a Compiled Class</li> <li>• Serializat ion (Native / JSON)</li> </ul>
Week 11	Java Web Technologies (Nov. 15-21)	<a href="#">Readings and Multimedia: Topic 11</a>	<ul style="list-style-type: none"> <li>• Retrieve stock prices</li> <li>• Project Plan for Final Project</li> </ul>
Week 12	Java Streams API (Nov. 22-28)	<a href="#">Readings and Multimedia: Topic 12</a>	<ul style="list-style-type: none"> <li>• Counting in Streams</li> <li>• Math with Lambdas (Strategy Pattern)</li> </ul>
Week 13	Java Graphical User Interfaces (Nov. 29 - Dec. 5)	<a href="#">Readings and Multimedia: Topic 13</a>	<ul style="list-style-type: none"> <li>• Simple Arithmeti c Calculato r</li> </ul>

			<ul style="list-style-type: none"> <li>Multi-Threaded Hello World</li> </ul>
Week 14	Final Project Presentations (Dec. 6 - 12)	N/A	N/A
Week 15	Final Project Code Review (Dec. 13 - 19)	N/A	N/A

## COURSE MATERIALS

**Textbook(s):** There is no required textbook for this course. There is a wealth of material available in the public domain and through resources subscribed to by Stevens. Links to or copies of relevant materials will be presented with each week's lecture notes.

Some weekly meetings will draw from this online textbook available for free under a Creative Commons license: [Programming via Java](#)

[\(Links to an external site.\)](#)

by Carl Burch

**Other Readings:** If you do *want* a textbook, [Intro to Java Programming, Comprehensive Version](#) by Y. Daniel Liang is recommended by the department.

[Java Programming: From the Beginning](#) by K. N. King is also an excellent introduction to the language. It is currently out of print but can be bought used fairly inexpensively.

For more advanced study, [Effective Java](#) by Joshua Bloch is indispensable. We will be discussing some of the ideas from this book in class, but you will not need to purchase it. If you enjoy this course, though, and want to improve your knowledge of the language, I highly recommend reading this one.

## COURSE REQUIREMENTS

**Attendance:** Because this is a Web-Campus course, attendance at live lectures is not required but is strongly encouraged. However, if you cannot attend for any reason, recordings will be made available via Canvas.



**Participation:** Weekly discussion threads will be posted for each lecture topic. The goal of these discussion posts is to engage critically with the week's materials and share ideas with your classmates. You are required to participate in these discussions by responding to the suggested prompts I include in the discussion threads, adding your own questions/comments about the material, and/or responding to other students' posts. You will receive full credit for the week as long as you make at least one post in the discussion thread.

**Homework:** The best way to learn to program is through practice. Therefore, this class requires several short assignments to be completed each week. Each assignment will be accompanied by some starter code so that you only have to write a few material pieces of the program. Assignments must be submitted through GitHub Classroom unless otherwise specified.

**Quizzes:** Quizzes will be assigned every other week through Canvas.

**Project(s):** Students will have five weeks to collaborate on a group project in teams of three to five students. Teams will be assigned randomly based on project preference. A list of pre-approved projects that can be chosen will be provided. Students will be graded based on their ability to complete the requirements of the project they select as well as an oral presentation delivered one week before the final project is due. In the first week, teams will be asked to plan out various milestones of their project. In addition to their final deliverables, students are expected to show weekly progress towards these milestones. Failure to show some progress each week will result in a lower final grade.

**Exams:** There will be one mid-term exam covering material from the first half of the semester. A review session will be held during the live lecture scheduled for the week of the exam.

## TECHNOLOGY REQUIREMENTS

### Baseline technical skills necessary for online courses

- Basic computer and web-browsing skills
- Navigating Canvas

### Required Equipment

- Computer: current Mac (OS X) or PC (Windows 7+/Linux) with high-speed internet connection
- Webcam: built-in or external webcam, fully installed

- Microphone: built-in laptop or tablet mic or external microphone

## Required Software

- [Git](#)
- [\(Links to an external site.\)](#)
- [Java Development Kit \(JDK\) 15](#)
- [\(Links to an external site.\)](#)
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## Recommended Software

- [VisualStudio Code](#)
- [\(Links to an external site.\)](#)
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- At least one Java-specific Integrated Development Environment:
  - [IntelliJ IDEA](#)
  - [\(Links to an external site.\)](#)
  - 
  - [Eclipse](#)
  - [\(Links to an external site.\)](#)
  - 
  - [Netbeans](#)
  - [\(Links to an external site.\)](#)
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## GRADING PROCEDURES

Grades will be based on:

Homework	20%
Quizzes	10%
Discussion Board Submissions	5%
Midterm Exam	30%
Final Project	35%

Homework Grading Policy:

Unless otherwise specified, each homework assignment will be graded on a four-point scale:

- 0pts if the assignment is not turned in
- 1pt if the assignment is turned in but does not compile
- 2pts if the assignment can be compiled but cannot be run
- 3pts if the assignment runs but produces the wrong output
- 4pts if the assignment runs correctly

Some homework assignments are larger and will be broken up into multiple parts. Grading for those assignments will be described in the individual assignment.

If more than five homework assignments are not submitted, you will not be able to earn an A in the course.

If you do not receive full credit on an assignment, you are always able to make a new submission and request that I regrade it. Please fill out the Assignment Re-grade Request found in the course menu once you have updated your submission.

### Late Policy:

Every homework has a due date. If for any reason, you are not able to meet this due date, I will record a 0 for that assignment, but you may still submit the assignment at a later date at which point I will revise your grade accordingly. There is no penalty for submitting the assignment late, but it does add a significant administrative burden to me. Please do not abuse this policy. Please complete the Assignment Re-grade Request found in the course menu after you have submitted your late assignment so that I will know it is ready for me to grade.

### Academic Integrity

#### Undergraduate Honor System

Enrollment into the undergraduate class of Stevens Institute of Technology signifies a student's commitment to the Honor System. Accordingly, the provisions of the Stevens Honor System apply to all undergraduate students in coursework and Honor Board proceedings. It is the responsibility of each student to become acquainted with and to uphold the ideals set forth in the Honor System Constitution. More information about the Honor System including the constitution, bylaws, investigative procedures, and the penalty matrix can be found online at <http://web.stevens.edu/honor/>

[\(Links to an external site.\)](#)

The following pledge shall be written in full and signed by every student on all submitted work (including, but not limited to, homework, projects, lab reports, code, quizzes and exams) that is assigned by the course instructor. No work shall be graded unless the pledge is written in full and signed.

***“I pledge my honor that I have abided by the Stevens Honor System.”***

#### Reporting Honor System Violations

Students who believe a violation of the Honor System has been committed should report it within ten business days of the suspected violation. Students have the option to remain anonymous and can report violations online at [www.stevens.edu/honor](http://www.stevens.edu/honor)

[\(Links to an external site.\)](#)

#### **Graduate Student Code of Academic Integrity**

All Stevens graduate students promise to be fully truthful and avoid dishonesty, fraud, misrepresentation, and deceit of any type in relation to their academic work. A student's submission of work for academic credit indicates that the work is the student's own. All outside assistance must be acknowledged. Any student who violates this code or who knowingly assists another student in violating this code shall be subject to discipline.

All graduate students are bound to the Graduate Student Code of Academic Integrity by enrollment in graduate coursework at Stevens. It is the responsibility of each graduate student to understand and adhere to the Graduate Student Code of Academic Integrity. More information including types of violations, the process for handling perceived violations, and types of sanctions can be found at [www.stevens.edu/provost/graduate-academics](http://www.stevens.edu/provost/graduate-academics)

[\(Links to an external site.\)](#)

#### **Special Provisions for Undergraduate Students in 500-level Courses**

The general provisions of the Stevens Honor System do not apply fully to graduate courses, 500 level or otherwise. Any student who wishes to report an undergraduate for a violation in a 500-level course shall submit the report to the Honor Board following the protocol for undergraduate courses, and an investigation will be conducted following the same process for an appeal on false accusation described in Section 8.04 of the Bylaws

of the Honor System. Any student who wishes to report a graduate student may submit the report to the Dean of Graduate Academics or to the Honor Board, who will refer the report to the Dean. The Honor Board Chairman will give the Dean of Graduate Academics weekly updates on the progress of any casework relating to 500-level courses. For more information about the scope, penalties, and procedures pertaining to undergraduate students in 500-level courses, see Section 9 of the Bylaws of the Honor System document, located on the Honor Board website.

## EXAM CONDITIONS

In the "Real World," you will rarely be asked to produce programs without referencing any outside resources. Therefore, you are permitted to use outside resources in exams and quizzes. The following procedures apply to quizzes and exams for this course. As the instructor, I reserve the right to modify any conditions set forth below by printing revised Exam Conditions on the quiz or exam.

1. Students may use the following materials during quizzes and/or exams. Any materials that are not mentioned in the list below are not permitted.

Material	Permitted?	
Handwritten Notes		
Typed Notes		

Textbooks		
Readings		
Online Resources		

2. Students are not allowed to work with or talk to other students during quizzes and/or exams. The work you submit must be your own.

## LEARNING ACCOMMODATIONS

Stevens Institute of Technology is dedicated to providing appropriate accommodations to students with documented disabilities. The Office of Disability Services (ODS) works with undergraduate and graduate students with learning disabilities, attention deficit-hyperactivity disorders, physical disabilities, sensory impairments, psychiatric disorders, and other such disabilities in order to help students achieve their academic and personal potential. They facilitate equal access to the educational programs and opportunities offered at Stevens and coordinate reasonable accommodations for eligible students. These services are designed to encourage independence and self-advocacy with support from the ODS staff. The ODS staff will facilitate the provision of accommodations on a case-by-case basis.

For more information about Disability Services and the process to receive accommodations, visit <https://www.stevens.edu/office-disability-services>

[\(Links to an external site.\)](#)

. If you have any questions please contact: Phillip Gehman, the Director of Disability Services Coordinator at Stevens Institute of Technology at [pgehman@stevens.edu](mailto:pgehman@stevens.edu) or by phone 201-216-3748.

### Disability Services Confidentiality Policy

Student Disability Files are kept separate from academic files and are stored in a secure location within the Office of Disability Services. The Family Educational Rights Privacy Act (FERPA, 20 U.S.C. 1232g; 34CFR, Part 99) regulates disclosure of disability documentation and records maintained by Stevens Disability Services. According to this act, prior written consent by the student is required before our Disability Services office

may release disability documentation or records to anyone. An exception is made in unusual circumstances, such as the case of health and safety emergencies.

## **INCLUSIVITY**

### **Name and Pronoun Usage**

As this course includes group work and class discussion, it is vitally important for us to create an educational environment of inclusion and mutual respect. This includes the ability for all students to have their chosen gender pronoun(s) and chosen name affirmed. If the class roster does not align with your name and/or pronouns, please inform the instructor of the necessary changes.

### **Inclusion Statement**

Stevens Institute of Technology believes that diversity and inclusiveness are essential to excellence in academic discourse and innovation. In this class, the perspective of people of all races, ethnicities, gender expressions and gender identities, religions, sexual orientations, disabilities, socioeconomic backgrounds, and nationalities will be respected and viewed as a resource and benefit throughout the semester. Suggestions to further diversify class materials and assignments are encouraged. If any course meetings conflict with your religious events, please do not hesitate to reach out to your instructor to make alternative arrangements.

You are expected to treat your instructor and all other participants in the course with courtesy and respect. Disrespectful conduct and harassing statements will not be tolerated and may result in disciplinary actions.

## **MENTAL HEALTH RESOURCES**

Part of being successful in the classroom involves a focus on your whole self, including your mental health. While you are at Stevens, there are many resources to promote and support mental health. The Office of Counseling and Psychological Services (CAPS) offers free and confidential services to all enrolled students who are struggling to cope with personal issues (e.g., difficulty adjusting to college or trouble managing stress) or psychological difficulties (e.g., anxiety and depression). Appointments can be made by phone (201-216-5177).

## EMERGENCY INFORMATION

In the event of an urgent or emergent concern about the safety of yourself or someone else in the Stevens community, please immediately call the Stevens Campus Police at 201-216-5105 or on their emergency line at 201-216-3911. These phone lines are staffed 24/7, year round. For students who do not reside near the campus and require emergency support, please contact your local emergency response providers at 911 or via your local police precinct. Other 24/7 national resources for students dealing with mental health crises include the National Suicide Prevention Lifeline (1-800-273-8255) and the Crisis Text Line (text “Home” to 741-741). If you are concerned about the wellbeing of another Stevens student, and the matter is *not* urgent or time-sensitive, please email the CARE Team at [care@stevens.edu](mailto:care@stevens.edu). A member of the CARE Team will respond to your concern as soon as possible.