

# SWE 642

## Software Engineering for the World Wide Web

Spring Semester, 2025  
Location: **David King Jr. Hall 1006**  
Time: Tuesday 7:20-10:00 PM

---

[Instructor](#) [Overview](#) [Textbook and Readings](#) [Grading](#) [Schedule](#) [Academic Integrity](#)

---

Professor:	<b>Dr. Vinod Dubey</b>
Email:	<a href="mailto:vdubey@gmu.edu">vdubey@gmu.edu</a>
Class Hours:	Tuesday 7:20-10:00
Prerequisite:	SWE 619 and SWE Foundation material or (CS 540 and 571)
Office Hours:	Anytime electronically, or by an appointment
GTA:	<b>Sabiha Salma</b> <a href="mailto:ssalma@gmu.edu">ssalma@gmu.edu</a>
GTA Office	TBD – Please check GTA office hours site
Hours/Location:	<a href="https://cs.gmu.edu/academics/gta-office-hours/">https://cs.gmu.edu/academics/gta-office-hours/</a>

---

## Overview

### OBJECTIVE:

After completing the course, students will understand the concepts and have the knowledge of how web applications are designed and constructed using modern Web development frameworks. Students will be able to design and implement high quality building blocks for Web applications aimed to provide a Full Stack Web development experience.

---

### CONTENT:

Detailed study of the engineering methods and technologies for building highly interactive web sites for e-commerce and other web-based applications. Engineering principles for building web sites that exhibit high reliability,

usability, availability, scalability and maintainability are presented. Methods such as client-server programming, component-based software development, middleware, and reusable components are covered. After the course, students should be prepared to create software for large-scale web sites.

SWE 642 teaches some of the topics related to the exciting full stack software development models that are used to support web and e-commerce applications. We will be studying the software design and development side of web applications, rather than the policy, business, or networking sides. An introductory level knowledge of HTML and Java is required. SWE 619 is a required prerequisite and SWE 632 is a good background course. The class will be very practical (how to build things) and includes several programming assignments.

The course content will focus on client-side and server-side software design and development. We will learn technologies such as **HTML5, CSS3, Bootstrap, JavaScript, Ajax, DOM, Web Development Frameworks, such as Angular, Vue.js, TypeScript, Node.js, Microservices, Java Persistence API (JPA 2.0)/Hibernate, RESTful Web services, Spring Framework, Spring Boot, the Docker container technology, Message Streaming with Apache Kafka, and an Introduction to AWS cloud platform (EC2, S3)**

## Textbook and Readings

- *Internet & World Wide Web How to Program (5th Edition)*, P.J. Deitel and H.M. Deitel, Pearson Prentice Hall (Recommended)
  - *Java: How to Program*, 11th edition, Deitel and Deitel, Prentice Hall. (Recommended)
  - *Spring Boot: Up and Running: Building Cloud Native Java and Kotlin Applications* 1st Edition by Mark Heckler (Recommended)
  - *Kafka: The Definitive Guide: Real-Time Data and Stream Processing at Scale* 2nd Edition by Gwen Shapira, Todd Palino, Rajini Sivaram, Krit Petty (Recommended)
  - TO BE UPDATED
-

## Grading

### EXAMS:

There will be a midterm and a final exam, both in class, possibly using Blackboard. The final exam will focus on material covered after the midterm.

**Phone Use Policy:** Phones should be switched off during the mid-term and final exams. Phones, especially smart phones with Internet access and camera, are not allowed to be on person during exams.

### HOMEWORK/PROGRAMMING ASSIGNMENTS:

Several homework assignments will be given. I will post the assignments on the class web site or on Blackboard and discuss them in class. You will submit your solutions by placing links to the executables on your class web sites and submitting the source files through [blackboard](#). Any refinements and hints for the assignments will be sent through email as well as posted on blackboard. Assignments will be checked immediately after the due date; if you finish an assignment late, you must inform us by email when it is ready for us to grade it. Changing an assignment after the due date without prior permission will be treated as a late submission. Programs will be graded on style and formatting as well as for correctness.

### MAKEUPS:

Unless arrangements are worked out in advance, missed tests **cannot** be made up, and 10 percent per class meeting will be deducted for late homework submissions. Under no circumstances will any assignment be accepted after the official end of classes (the start of finals week).

### GRADING:

Grades will be (approximately): 33% the midterm, 33% the final, 28% the programming assignments, 6% class participation/project presentation. Final weighted average is assigned a letter grade according to the following ranges:

Percentage	Grade
[99, 100]	A+
[92, 98]	A
[90, 91]	A-
[88, 89]	B+
[82, 87]	B
[80, 81]	B-

[78, 79]	C+
[72, 77]	C
[70, 71]	C-
[60, 69]	D
[0, 59]	F

## Schedule (subject to change; check regularly)

Week	Date	Lecture topic	Readings	Announcements
1	1/21	<p><b>Course Overview</b> Introduction to the Internet and World Wide Web</p> <p><b>Computing Platform</b> Intro to AWS cloud, and Static Web Site Hosting on Amazon S3 and EC2</p>	<ul style="list-style-type: none"> <li>• DD1, <a href="#">paper</a></li> <li>• <a href="https://aws.amazon.com/">https://aws.amazon.com/</a></li> <li>• <a href="https://aws.amazon.com/ec2/">https://aws.amazon.com/ec2/</a></li> <li>• <a href="https://aws.amazon.com/s3/">https://aws.amazon.com/s3/</a></li> </ul>	HW1 - Website Hosting in Amazon S3, and EC2
2	1/28	<p><b>Intro to Web Software</b> Hypertext Markup Language (HTML5)</p> <p><b>Presentation &amp; Styles</b> Cascading Style Sheets (CSS)</p>	<ul style="list-style-type: none"> <li>• DD 2, 3</li> <li>• <a href="https://www.w3schools.com">https://www.w3schools.com</a></li> <li>• <a href="https://www.w3schools.com/html/">https://www.w3schools.com/html/</a></li> <li>•</li> </ul>	
3	2/04	<p><b>Bootstrap –</b> CSS Framework</p> <p><b>Client-side Software</b> JavaScript, JavaScript Functions, Arrow Function, Cookie, Event Handling</p>	<ul style="list-style-type: none"> <li>• DD 4, 5</li> <li>• <a href="https://www.w3schools.com">https://www.w3schools.com</a></li> <li>• <a href="https://getbootstrap.com/">https://getbootstrap.com/</a></li> <li>• <a href="https://www.w3schools.com/bootstrap4/">https://www.w3schools.com/bootstrap4/</a></li> <li>• DD 6-13, 16</li> <li>• <a href="https://www.w3schools.com/js/default.asp">https://www.w3schools.com/js/default.asp</a></li> <li>•</li> </ul>	HW2 - Website Hosting in Amazon S3 HTML, CSS, Bootstrap, JavaScript

4	2/11	<b>Client-side Software</b> More on JavaScript: JSON, Ajax, TypeScript; Node.JS	<ul style="list-style-type: none"> <li>• <a href="https://www.w3schools.com/js/">https://www.w3schools.com/js/</a></li> <li>•</li> </ul>	
5	2/18	<b>Single-Page Application (SPA)</b> Angular JavaScript Framework	<ul style="list-style-type: none"> <li>• Class notes, <a href="https://angular.io/docs">https://angular.io/docs</a></li> <li>•</li> </ul>	
6	2/25	<b>Single-Page Application (SPA)</b> Vue.js	<ul style="list-style-type: none"> <li>• <a href="https://vuejs.org/guide/quick-start">https://vuejs.org/guide/quick-start</a></li> <li>•</li> </ul>	HW3-Angular, REST API
7	3/04	<b>REST APIs</b> using Spring Boot  <b>Midterm Exam Review</b>	<ul style="list-style-type: none"> <li>• <a href="https://www.geeksforgeeks.org/spring-boot-introduction-to-restful-web-services/">https://www.geeksforgeeks.org/spring-boot-introduction-to-restful-web-services/</a></li> <li>•</li> </ul>	
8	3/11	<b>Spring Break</b> (March 10-16)	<ul style="list-style-type: none"> <li>• No class this week</li> </ul>	
9	3/18	<b>Midterm Exam</b> (7:20 pm - 10:00 pm)	<b>In the Classroom/Online Blackboard</b>	
10	3/25	<b>Spring Framework; Spring Boot</b> – Implementing Microservices on Java platform	<ul style="list-style-type: none"> <li>• <a href="https://spring.io/">https://spring.io/</a></li> <li>•</li> </ul>	
11	4/01	<b>Data Persistence</b> ORM, Java Persistence API (JPA 2.0)/Hibernate  Implementing persistence layer using Spring Boot	<ul style="list-style-type: none"> <li>• Appendix C, JHTP 28</li> <li>• <a href="http://www.w3schools.com">http://www.w3schools.com</a></li> <li>• JHTP Chapter 31</li> <li>• <a href="https://spring.io/projects/spring-boot">https://spring.io/projects/spring-boot</a></li> </ul>	HW4 – Vue.js, REST API, and Persistence Layer with JPA(Hibernate)

12	4/08	<b>Service Tier</b> REST architecture and RESTful Web Services; JAX-RS  Building RESTful Webservices with Spring Boot	<ul style="list-style-type: none"> <li>• <a href="https://spring.io/projects/spring-boot">https://spring.io/projects/spring-boot</a></li> <li>• </li> <li>• </li> </ul>	
13	4/15	<b>Containerizing Web Applications</b> Docker Containers, Intro to Kubernetes	<a href="https://www.docker.com/">https://www.docker.com/</a>  <a href="https://hub.docker.com/">https://hub.docker.com/</a>	
14	4/22	<b>Event Driven Microservices</b> Java Message Service, Apache Kafka	<a href="https://kafka.apache.org/">https://kafka.apache.org/</a>	HW5 – Optional Extra Credit
15	4/29	<b>Project Presentation (Optional)</b> <b>Final Exam Review</b>		
16	5/06	<b>Reading Day</b>	NO CLASS	
17	5/13	<b>Final Exam</b>	In the classroom/Online	

Note: DD refers to chapters in Deitel & Deitel's Internet and WWW book, and JHTP refers to chapters in Java How to Program book

---

## Academic Integrity

George Mason's [policy](#) concerning student conduct applies. Although students are encouraged to discuss the topics covered in class, all homework assignments, exams, and projects are to be completed individually, unless joint work is

explicitly authorized by the instructor. If joint work is authorized, all contributing students must be listed on the submission. Any deviation from this is considered an Honor Code violation, and, as a minimum, will result in failure of the submission and, as a maximum, failure of the class.

Please note that there are two honor code policies: an abstract GMU policy and a more specific departmental policy with regard to code plagiarism, test-taking, etc. The students can find them here: [Honor Code Policies](#)

---

## Disabilities

If you are a student with a disability and you need academic accommodations, please see me and contact the Disability Resource Center (DRC) at 993-2474. All academic accommodations must be arranged through the DRC.