

# SWE 642

## Software Engineering for the World Wide Web

Fall Semester, 2022

Location: **Art and Design Building 2003**

Time: Tuesday 7:20-10:00 PM

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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>Parastoo Kamranfar</b> ( <a href="mailto:pkamranf@gmu.edu">pkamranf@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>

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## Overview

### OBJECTIVE:

After completing the course, students will understand the concepts and have the knowledge of how web applications are designed and constructed. Students will be able to engineer high quality building blocks for Web applications.

### 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 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 require 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, Angular-Web Development Framework, TypeScript, Architecture Patterns: Model View Controller (MVC), Model-View-ViewModel (MVVM), Microservices, JDBC, Java Persistence API (JPA 2.0), RESTful Web services, Spring Framework, Spring Boot, and the Docker container technology to containerize Web Applications, and an Introduction to AWS cloud platform. The course aims to provide Full Stack web development experience on AWS cloud.**

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## 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

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## 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): 30% the midterm, 30% the final, 30% the programming assignments, 10% class participation/quizzes. Final weighted average is assigned a letter grade according to the following ranges:

<b>Percentage</b>	<b>Grade</b>
[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	1/24	<b>Course Overview</b> Introduction to the Internet and World Wide Web	<ul style="list-style-type: none"> <li>DD1, <a href="#">paper</a></li> </ul>	
2	1/31	<b>Computing Platform</b> Intro to AWS cloud, EC2, and S3	<ul style="list-style-type: none"> <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
3	2/07	<b>Intro to Web Software</b> Hypertext Markup Language (HTML5)	<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>	
4	2/14	<b>Presentation &amp; Styles</b> Cascading Style Sheets (CSS)  <b>Bootstrap</b> Framework	<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></li> </ul>	HW2 – HTML, CSS, Bootstrap
5	2/21	<b>Client-side Software</b> JavaScript, JavaScript Functions, Event Handling	<ul style="list-style-type: none"> <li>DD 6-13, 16</li> <li><a href="https://www.w3schools.com">https://www.w3schools.com</a></li> <li><a href="https://www.w3schools.com/js/default.asp">https://www.w3schools.com/js/default.asp</a></li> </ul>	
6	2/28	<b>Client-side Software</b> More on JavaScript; Cookie, Ajax; DOM	<ul style="list-style-type: none"> <li><a href="https://www.w3schools.com/js/">https://www.w3schools.com/js/</a></li> <li></li> </ul>	
7	3/07	<b>Single-Page Application (SPA)</b>	<ul style="list-style-type: none"> <li>Class notes, <a href="https://angular.io/docs">https://angular.io/docs</a></li> <li></li> </ul>	

		Angular – Web Development Framework, TypeScript		
8	3/14	<b>Spring Break</b>	<b>No Class</b>	
9	3/21	<b>Midterm Exam</b> (7:20 pm - 10:00 pm)	<b>In the Classroom/Online Blackboard</b>	
10	3/28	<b>Intro to Microservices, Spring Framework, and Spring Boot</b>	<ul style="list-style-type: none"> <li>• <a href="https://spring.io/">https://spring.io/</a></li> <li>•</li> </ul>	HW3-Angular, REST, JPA(Hibernate)
11	4/04	<b>Data Persistence</b> ORM, Java Persistence API (JPA 2.0)/Hibernate  Implementing Persistence Layer using Spring Data JPA with Hibernate	<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>	
12	4/11	<b>Service Tier</b> REST architecture and RESTful Web Services  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> </ul>	
13	4/18	<b>Containerizing Web Applications</b> Docker Containers	<a href="https://www.docker.com/">https://www.docker.com/</a>  <a href="https://hub.docker.com/">https://hub.docker.com/</a>	HW4 – Containerizing Web applications
14	4/25	<b>Event Driven Microservices</b> Apache Kafka; ActiveMQ (Optional)	<a href="https://kafka.apache.org/">https://kafka.apache.org/</a>	
15	5/02	<b>Designing Resilient Architectures in AWS</b>  Final Exam Review	•	

16	5/09	<b>Reading Day</b>	No class	
17	5/16	<b>Final Exam Week</b>	In the classroom/Online Blackboard	

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

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## 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](#)

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## 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.