Carnegie Mellon University
Master of
Software Engineering

17636 - DevOps: Engineering for Secure Development and Deployment
Fall 2025, 12 Units-3SC 265 , MW 08:00 – 9:20 AM

Instructors	Email	Office Location & Hours
Prf. Len Bass	lb3a@andrew.cmu.edu	by appointment
Prf. Hasan Yasar	hyasar@cmu.edu	by appointment

Course Description. DevOps has three facets: culture, organization, and technology. This course focuses on the technology aspect. You will learn the basics of the infrastructure important to utilizing DevOps tools. To appropriately build and deploy systems developers should know not only about development tools such as container management tools but also the structure of the cloud – in particular how it utilizes virtual machines, containers, and networks. They should also understand security mechanisms both in the internet and how to authorize users and maintain credentials securely. Finally, to protect the system once it is placed into production, a developer needs to know how to enable the detection of problems during execution through the collection and navigation of logs produced by the system You will also learn the theory of fundamental DevOps concepts including CI,CD, Monitoring and Feedback. You will also see several case studies having to do with specialized forms of DevOps – Machine Learning and the Highly Regulated Environments. Finally, you will see samples of the main DevOps tools.

Activities.: The activities you will do for the course are:

Prior to each class session.

1. Watch the videos as enumerated below.
2. Read the sections of the textbook and additional references as enumerated below
3. Create a question for class discussion

During each class session

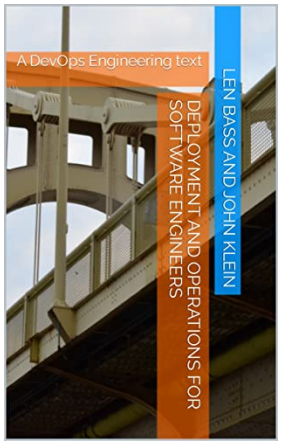
1. Take a short quiz over the preceding day's videos, readings, and discussion.
2. Participate in a discussion over the material in that day's video and reading.
3. Participate in other discussions and breakout groups as assigned during the class.

Prior Knowledge. Although no specific programming knowledge is required, you should know several programming languages and several operating systems. You should not be intimidated about navigating the internet to find information about specific tools, their installation, and their use.

Learning Objectives. After completing this course, you will be able to:

- Explain the concepts of the cloud infrastructure and infrastructure security.
- Enumerate and explain the theory of DevOps (CI,CD,CM)
- Explain the common classes of DevOps tools
- Practice Secure Development and Deployment
- Navigate the internet to learn about tool installation and use.

Learning Resources. There is a textbook required for this course. The details are:



Title: Deployment and Operations for Software Engineers
Authors: Len Bass and John Klein
Software engineering practices require knowledge of the environment in which an application is to be run. In the modern world, this means knowledge of virtualization, containers, networking, the cloud, and security techniques for the internet. A developer should also know about microservices, configuration management, the deployment pipeline, monitoring and post production, disaster recovery, and how to develop secure applications. These topics, and more, are all covered in this book. The book includes exercises and discussion questions to facilitate classroom or group learning.. Order it from Amazon.

Videos: The videos for this class can be found at canvas site

Assignments and due dates. **Available on Canvas**

Assignment 1 (Solo): *VM/Container and DNS, Due on:* ***Sep 17th***
Assignment 2 (Solo): *Containers and Networking, Due on:* ***Oct 1st***
Assignment 3 (Solo): *SSH, Due on:* ***Oct 22nd***
Assignment 4 (Team): *DSO Pipeline, Due on:* ***Dec 5th***

Each assignment has three portions

- Fulfilling the assignment by performing the specified actions and code/scripts (60%)
- Enumerating the steps required to perform the specified actions. This enumeration should be usable by someone unfamiliar with the actions and Screenshots of each key step (20%)
- A one or two-paragraph reflection describing the most serious problem you ran into while performing the assignment and how you got around the problem.

Assessments.

- **Assessment 1**, Daily quizzes:
- **Assessment 2**, Final Team Project Presentation
- **Assessment 3,** Assignments:
- **Class participation**, Remaining until the end of class, posting questions as described above, and participating in class discussions.

Assessment	Final Grade %
Daily quizzes	20%
Final Exam	30%
Assignments	40%
Class participation	10%

Grade	Percentage Interval
A	90-100%
B	80-89%
C	70-79%
D	60-69%
R (F)	59% or below

Course and Grading Policies

- **Late-work policy**: All work is expected to be handed in at the indicated due date and time. For fairness to the whole class, no late submissions will be accepted for the group work. In the first week of classes, you should receive a course schedule for each course; please use them to plan ahead.

  Each student is allowed one late submission for the individual homework assignments. You should immediately notify the course TA(s) before the submission deadline that you will submit late. Late work must be submitted as soon as circumstances allow, ordinarily within 24 hours of the due date. If you have any questions you should raise them immediately rather than waiting for conflicts to arise.

- **Participation policy**. Class participation will be graded by in-class engagement, including asking relevant questions based on a critical review of required readings, lectures, and comments made by your peers. The lack of attendance, and the use of mobile devices, including phones and laptops, will count against your participation grade.

Course Schedule. The following schedule provides a general overview of topics. Please refer to the syllabus online in Canvas for specific lecture topics, and reading assignments.

Class date	Topic and video. Unless otherwise indicated	Readings
Mon, Aug 25	00- Intro and Course Objectives/Logistics	
Wed, Aug 27	01- Platform and DevOps Preliminaries	Textbook: Chap 1
Mon, Sep 01	No Classes Labor Day	
Wed, Sep 03	02- Virtualization and Container	Textbook: Chap 2
Mon, Sep 08	03- Networking 1	Textbook: Chap 3
Wed, Sep 10	04- Networking 2	Textbook: Chap 3
Mon, Sep 15	05- Cloud 1	Textbook: Chap 4
Wed, Sep 17	06- Cloud 2	Textbook: Chap 4
Mon, Sep 22	07- Container Management	Textbook Chap 5
Wed, Sep 24	08- Measurement	Textbook: Chap 6
Mon, Sep 29	09- Infrastructure security 1	Textbook: Chap 7
Wed, Oct 01	10- Infrastructure security 2	Textbook: Chap 7
Mon, Oct 06	11- What is DevOps - 1	Textbook: Chapter 9
Wed, Oct 08	12- What is DevOps - 2	Textbook: Chapter 9
Oct 13 & 17	Fall Break	
Mon, Oct 20	13- Basic DevOps tools -1	Textbook: Chapter 10

Class date	Topic and video. Unless otherwise indicated	Readings
Wed, Oct 22	14- Basic DevOps tools -2	Textbook: Chapter 10
Mon, Oct 27	15- Deployment pipeline -1	Textbook: Chapter 11
Wed, Oct 29	16- Deployment pipeline -2	Textbook: Chapter 11
Mon, Nov 03	17- Deployment pipeline -3	Textbook: Chapter 11
Wed, Nov 05	18- Design Options - 1	Textbook: Chapter 12
Mon, Nov 10	19- Design Options - 2	Textbook: Chapter 12
Wed, Nov 12	20- Service Mesh	Textbook: Chapter 12
Mon, Nov 17	21- Postproduction , SRE, YBRI, PE	Textbook: Chapter 13
Wed, Nov 19	22- DevSecOps - 1	Textbook: Chapter 14
Mon, Nov 24	23- DevSecOps -2	Textbook: Chapter 14
Wed, Nov 26	No Class – Thanksgiving Break	
Mon, Dec 01	24- Disaster Recovery	Textbook: Chapter 15
Wed, Dec 03	Final	

Accommodations for Students Disabilities. If you have a disability and have an accommodations letter form the Disability Resources office, I encourage you to discuss your accommodations and needs with me as early in the semester as possible. I will work with you to ensure that accommodations are provided as appropriate. If you suspect that you may have a disability and would benefit from accommodations but are not yet registered with the Office of Disability Resources, I encourage you to contact them at access@andrew.cmu.edu.

Academic Integrity. Honesty and transparency are important to good scholarship. Plagiarism and cheating, however, are serious academic offenses with serious consequences. If you are discovered engaging in either behavior in this course, you will earn a failing grade on the assignment in question, and further disciplinary action may be taken.

For a clear description of what counts as plagiarism, cheating, and/or the use of unauthorized sources, please see the University's Policy on Academic Integrity.

If you have any questions regarding plagiarism or cheating, please ask me as soon as possible to avoid any misunderstandings. For more information about Carnegie Mellon's standards with respect to academic integrity, you can also check out the Office of Community Standards & Integrity website.

Utilizing Generative AI: We expect that all work students submit for this course will be their own. We have carefully designed all assignments and class activities to support your learning. Doing your own work, without human or artificial intelligence assistance, is best for your achievement of the learning objectives in this course. In instances when collaborative work is assigned, We expect for the submitted work to list all team members who participated. We specifically forbid the use of ChatGPT or any other generative artificial intelligence (AI) tools at all stages of the work process, including brainstorming. Deviations from these guidelines will be considered violations of CMU's academic integrity policy. Note that expectations for "plagiarism, cheating, and acceptable assistance" on student work may vary across your courses and instructors. Please ask me if you have questions regarding what is permissible and not for a particular course or assignment.

Student Wellness. As a student, you may experience a range of challenges that can interfere with learning, such as strained relationships, increased anxiety, substance use, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may diminish your academic performance and/or reduce your ability to participate in

daily activities. CMU services are available, and treatment does work. You can learn more about confidential mental health services available on campus at the Counseling and Psychological Services website. Support is always available (24/7) from Counseling and Psychological Services: 412-268-2922.

Respect for Diversity. It is my intent that students from all diverse backgrounds and perspectives be well served by this course, that students' learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength, and benefit. It is my intent to present materials and activities that are respectful of diversity: gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture. Your suggestions are encouraged and appreciated. Please let me know if any of our class meetings conflict with your religious observations so that I can make alternate arrangements for you.