



CSYE 7220 Deployment and Operation of Software Applications

Course Information

Course Title: DevOps
Course Number: CSYE 7220
Term and Year: Spring 2022
Credit Hour: 4
Course Format: On-Ground

Instructor Information

Full Name: Dino(Constantin) Konstantopolous
Email Address: dino.k@northeastern.edu

Course Prerequisites

Graduate Level CSYE 6220 Minimum Grade of B- or Graduate Level INFO 6250 Minimum Grade of B-

Course Description

This class is an introduction on how to set up and operate software assembly lines on Public Clouds in the fashion of a “Ford Model T” assembly line. This class introduces you to the basic operations, methodologies, and principles of enterprise software development, where developers and system administrators skillsets merge to manage both software *development* and software *operations*. In the same way that languages like Java, C#, and Python power app development, languages like Terraform, Chef, and Ansible provision Public Clouds and no time is lost moving from application development to production operations and back. If application *development* is about building an aircraft, *operations* is the aircraft carrier that launches them into service and *DevOps* is how to do it to optimize the speed of IT.

Learning Outcomes

Learning outcomes common to all College of Engineering Graduate programs:

- 1. An ability to identify, formulate, and solve complex engineering problems.*
- 2. An ability to explain and apply engineering design principles, as appropriate to the program’s educational objectives.*
- 3. An ability to produce solutions that meet specified end-user needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.*

The Information Systems Program accepts students of different engineering backgrounds with minimum programming skills and produces first class Information Systems engineers that operate at the intersection of real-world complexity, software development, and IT management. Graduating students will be able to construct end-to-end advanced software applications that meet business needs.

Specific Learning Outcomes for the class:

You will get accustomed to moving seamlessly from one development language and platform to another because in the modern software industry no one tool or one language is enough. You will learn how to containerize a Web app written in C#, java, python, or Node with *Docker* and deploy it and scale it as a microservice, the basic unit of modern enterprise software.

You will learn about fundamental notions such as *Stack 2020*, the difference between *DevOps* and *Agile*, how companies like Uber and Netflix engineer enterprise applications as *microservices*, and the fundamentals of *Public Clouds* AWS and Azure, all of which are often part of job interview questions.

You will practice what you learn with hands-on labs and become an expert in how to create *Virtual Machines* and *Containers*, how to deploy software with scripting languages like *Terraform*, how to provision with *Ansible*, *Chef*, and the instructor's favorite *Juju*, how to automate and scale operations with orchestration platforms like *Kubernetes*, how to streamline deployment with Continuous integration and Continuous Delivery (CI/CD) pipelines, and how to monitor for performance with *Prometheus*.

Textbook

None

Attendance Policy

Students are expected to complete course readings, participate in class discussions or other learning activities during the unit, and complete written assignments for each unit during the time of that unit.

Late Work Policy

Students must submit assignments by the deadline in the time zone noted in the syllabus.

Students must communicate with TAs and faculty prior to the deadline if they anticipate work will be submitted late. Work submitted late without prior communication will lose points in proportion to how late it is submitted.

Grading/Evaluation Standards

30% Homework, 30% Midterm, 30% Final Project, 10% Final Exam.

Course Schedule

- Module 1: DevOps principles and introduction to AWS and Azure
- Module 2: Web architectures and their implementations in Node, C#, Java, and Python
- Module 3: DevOps with AWS and Azure CLIs
- Module 4: Microservice architectures and Docker
- Module 5: Deployment and scalability with Kubernetes
- Module 5: Public Cloud deployment operations
- Module 6: Continuous Integration and Continuous Deployment (CI/CD) with AWS Elastic Container Service (ECS)

- Module 7: Kubernetes clusters on AWS and Azure
- Module 8: Monitoring and telemetry with Prometheus, Grafana, and Consul
- Module 9: Ansible, Chef, and Juju
- Module 10: Special topics

End-of-Course Evaluation Surveys

Your feedback regarding your educational experience in this class is very important to the College of Professional Studies. Your comments will make a difference in the future planning and presentation of our curriculum.

At the end of this course, please take the time to complete the evaluation survey at <https://neu.evaluationkit.com>. Your survey responses are **completely anonymous and confidential**. For courses 6 weeks in length or shorter, surveys will be open one week prior to the end of the courses; for courses greater than 6 weeks in length, surveys will be open for two weeks. An email will be sent to your HuskyMail account notifying you when surveys are available.

Academic Integrity

A commitment to the principles of academic integrity is essential to the mission of Northeastern University. The promotion of independent and original scholarship ensures that students derive the most from their educational experience and their pursuit of knowledge. Academic dishonesty violates the most fundamental values of an intellectual community and undermines the achievements of the entire University.

As members of the academic community, students must become familiar with their rights and responsibilities. In each course, they are responsible for knowing the requirements and restrictions regarding research and writing, examinations of whatever kind, collaborative work, the use of study aids, the appropriateness of assistance, and other issues. Students are responsible for learning the conventions of documentation and acknowledgment of sources in their fields. Northeastern University expects students to complete all examinations, tests, papers, creative projects, and assignments of any kind according to the highest ethical standards, as set forth either explicitly or implicitly in this Code or by the direction of instructors.

Go to <http://www.northeastern.edu/osccr/academic-integrity-policy/> to access the full academic integrity policy.

Student Accommodations

Northeastern University and the Disability Resource Center (DRC) are committed to providing disability services that enable students who qualify under Section 504 of the Rehabilitation Act and the Americans with Disabilities Act Amendments Act (ADAAA) to participate fully in the activities of the university. To receive accommodations through the DRC, students must provide appropriate documentation that demonstrates a current substantially limiting disability.

For more information, visit <http://www.northeastern.edu/drc/getting-started-with-the-drc/>.

Library Services

The Northeastern University Library is at the hub of campus intellectual life. Resources include over 900,000 print volumes, 206,500 e-books, and 70,225 electronic journals.

For more information and for Education specific resources, visit <http://subjectguides.lib.neu.edu/edresearch>.

24/7 Blackboard Technical Help

For immediate technical support for Blackboard, call 617-373-4357 or email help@northeastern.edu

Within Blackboard, open a support case via the red support button on the right side of the screen, click Create Case

myNortheastern, e-mail, and basic technical support

Visit the [Information Technology Services \(ITS\) Support Portal](#)

Email: help@northeastern.edu

ITS Customer Service Desk: 617-373-4357

Diversity and Inclusion

Northeastern University is committed to equal opportunity, affirmative action, diversity and social justice while building a climate of inclusion on and beyond campus. In the classroom, member of the University community work to cultivate an inclusive environment that denounces discrimination through innovation, collaboration and an awareness of global perspectives on social justice.

Please visit <http://www.northeastern.edu/oidi/> for complete information on Diversity and Inclusion

TITLE IX

Title IX of the Education Amendments of 1972 protects individuals from sex or gender-based discrimination, including discrimination based on gender-identity, in educational programs and activities that receive federal financial assistance.

Northeastern's Title IX Policy prohibits Prohibited Offenses, which are defined as sexual harassment, sexual assault, relationship or domestic violence, and stalking. The Title IX Policy applies to the entire community, including male, female, transgender students, faculty and staff.

In case of an emergency, please call 911.

Please visit www.northeastern.edu/titleix for a complete list of reporting options and resources both on- and off-campus.