# Northeastern University

## TELE 6420 –Infrastructure Automation Design and Tools

## Fall 2024

## Syllabus

### Instructor Contact

Name: Rajiv Shridhar
Email: rajiv@coe.neu.edu
Work Phone: 617-324-6632
Office Location: Northeastern: DA-502, 110 Forsyth Street, Boston, MA
MIT: E52-013, 50 Memorial Drive, Cambridge, MA
Office Hours: By appointment, or before/after class

TAs: TBA 2nd week of the semester

### Course Description

In the modern technology world, automation of IT and cloud infrastructure is a critical component of being able to effectively and efficiently manage and support the dynamic needs of current applications. Infrastructure architects must design technologies that support rapid scaling of infrastructure up and down based on the needs of applications, while maximizing productivity, minimizing cost, and maintaining strong security and consistency. In many ways, this requires the treatment of hardware as “infrastructure as code”.

In this course, students will work together in teams to understand infrastructure automation design and tools for provisioning, security, monitoring, alerting, logging etc. The course is highly focused on team-based learning and project work, and involves the use of technologies such as Ansible, Puppet, Git, Selenium, Netmiko/Paramiko and infrastructure such as Docker.

The format is based on in-class lectures, readings, study/analysis of technologies, and active project work, all of which require active student participation. The course is highly focused on team-based projects, and hands-on assignments involving design, simulation, and packet analysis, and case studies. Students will also make summary/analysis presentations based on topics selected from the syllabus.

Students who enroll in this course must be prepared to work in teams on projects to research, analyze and make in-class presentations. Performance on homework assignments, projects, assigned study and classroom participation will serve as the basis for final grade.

### Prerequisites

There are no formal requirements for this 4-credit course but prior knowledge of Python, Linux and data networks is strongly recommended. The typical student for this course has completed the TELE

5330 Data Networks course and optionally the TELE 5360 Internet Protocols and Architectures course as well.

## Prescribed Text

There is no prescribed text for this course. The course is taught using a variety of assigned readings and self-study which will be provided or guided by the instructor.

## Course Layout

Befitting its structure, the layout of the course is being developed and will be better defined as we progress through the semester. I expect the course will run as a series of modules, each 1-2 weeks long. Modules will include topics such as:

- Infrastructure Automation Design Principles
- Infrastructure Automation with CfEngine
- Network Automation with Paramiko and Netmiko
- Version control with Git
- Infrastructure Automation with Puppet
- Infrastructure Automation with Chef
- Infrastructure Automation with Ansible
- Containers - Docker and Kubernetes
- Infrastructure Automation with Terraform
- Automation in the Cloud

Each module will be accompanied by assignments, and/or projects or analysis work, as appropriate. These, along with midterm and final exams, will serve as the basis for the overall course grade.

## Grading

Regular homework assignments, projects, exams, and presentations/term paper will serve as the basis for grades assigned in this course. Homework are typically due at the end of the lecture a week after it was assigned. The evaluation criteria are (tentatively):

- Assignments and Projects 45%
- Presentations and Analyses 20%
- Quizzes and Exams 35%

*NOTE: Class Participation is important. Though a percentage of your grade is not directly attributed, it is taken into account as appropriate. Also, beginning Fall 2024 the program requires attendance to be taken in each class.*

*NOTE: The evaluation criteria listed above are tentative, and may change during the course if needed, in order to better align with focus/interests of the class cohort.*

## Course Website

The Northeastern Canvas course environment, accessible via the myNortheastern portal, or directly at https://canvas.northeastern.edu serve as the conduit for class prep material, discussions, and assignments/submissions. The course site will be available to students beginning the second week of the course.

## 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.

Note that these commitments are taken seriously, and any violations will be reflected immediately in student grade.

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

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

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.

Student Responsibilities

- This is a highly hands-on, practically driven, project-based course covering advanced topics for which there are no convenient textbook materials or references. The topics covered will evolve as we progress through the course, based on our learning and student/instructor interest.

- Topics that I present and discuss in some detail in class require even further focus from you outside class, including both study and hands-on work. You are responsible for studying all material covered in class, in assigned reading and through external assignments, whether formally or informally assigned. You are also responsible for doing the associated study and hands-on work outside class as mentioned above.

- Performing the hands-on work prescribed during our lectures and other meetings, and participating in vivas as defined.

- Access to appropriate computing technology required for hands-on work on infrastructure automation tools, including virtualization toolkits and platforms. Note that virtualization support on the M1 and M2 Macs is still evolving.

- Reviewing, in advance, material to be covered in each lecture, and being prepared to participate in discussions about the material in class.

- Checking Blackboard regularly and frequently (preferably morning and evening) to receive communication about the course, including assignments etc.

- A quick word about e-mail correspondence: I receive a lot of e-mail every day. Your correspondence is important to me. To ensure that I notice your e-mail quickly and also to reduce the chances of your e-mail being marked as spam and mistakenly deleted, please prefix 'TELE6420:' to the subject line of your message.