# CSYE 6225 - Network Structures and Cloud Computing

Fall 2025

**Course Information**
Course Title: Network Structures and Cloud Computing.
Course Number: CYSE 6225-02
Term and Year: Fall 2025
Credit Hour: 4
CRN: 17541
Course Format: Seattle Traditional

**Instructor Information**
Full Name: David Fannin
Email Address:d.fannin@northeastern.edu
Office Hours: TBD

**Instructor Biography**
David is a senior software engineering executive from the Cloud, Infrastructure and Big Data domains, with extensive experience in creating, building and managing devops and software development teams, and leading product development efforts. He has held key engineering roles in Silicon Valley companies such as Amazon Web Services (AWS), Yahoo, Cisco, Juniper Networks and several startups that you've never heard of. David started his career as a Member of Technical Staff at AT&T Bell Laboratories in New Jersey. In these roles, he has spearheaded major software engineering initiatives, optimized software delivery processes, and transformed teams by driving revitalized software release processes, and improving software quality. He also introduced innovative new integration and deployment processes and products, including Agile Software Development and led major open-source projects including Contrail (Software Defined Networking), NetApp's open-source NFS kernel development, Yahoo's Bugzilla, and several others. David holds a Master's degree in Computer Science and a Bachelor's degree in Engineering, both from California Polytechnic State University , San Luis Obispo.

**Teaching Assistant Information**
Full Name: Cheng-Wen Hsu
Email Address: hsu.chen@northeastern.edu
Office Hours: TBD

**Course Prerequisites**
Graduate Level CSYE 6200 Minimum Grade of C- or Graduate Level INFO 5100 Minimum Grade of C-

**Course Description**
This foundational course provides hands-on experience in cloud application design, development, testing, and deployment using current software tools and cloud services. It is tailored for IT and business professionals who are cloud-aware but may have limited experience with software development and large-scale application building.

The course covers the core principles and architectures that underpin cloud computing. Students will explore the essential cloud services, including compute, networking, and storage, gaining a comprehensive understanding of how these components interact to form robust cloud ecosystems. Security in cloud environments is a critical focus, ensuring students are versed in protecting cloud-based assets and data. The curriculum also covers advanced topics such as application scaling and monitoring techniques, equipping students with the knowledge to optimize and maintain cloud applications effectively.

Alongside cloud computing concepts, the course emphasizes modern software development methodologies. Students will immerse themselves in Agile Software Development Life Cycle (SDLC) practices, learning how to apply these principles to cloud-based projects. The course introduces DevOps practices, bridging the gap between development and operations to streamline application design, building, and deployment processes. Practical skills in utilizing software repositories, implementing continuous integration, and leveraging automated testing strategies are integral parts of the curriculum. These DevOps techniques ensure students can create well-crafted, maintainable software applications that align with industry best practices.

**Course 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 Information Systems program:

1. Create a strong technical foundation through diverse, high-level courses
2. Built crucial interpersonal skills needed to succeed in any industry
3. Foster a deep level of applied learning through project based case studies

Upon successful completion of this course, students will be able to:

1. Explain the fundamental concepts of cloud computing, including service and deployment models.
2. Design and implement scalable cloud-based solutions using industry-standard tools and best practices.
3. Apply security best practices to protect cloud applications and data, including identity and access management.
4. Implement virtualization and containerization technologies in cloud environments.

5. Optimize cloud performance and cost, utilizing effective resource management strategies.
6. Develop disaster recovery and business continuity plans for cloud-based systems.
7. Apply DevOps principles to streamline development and deployment processes in the cloud.

**Required Tools and Course Textbooks.**
Minimum: An active AWS free tier account. (AWS Free Tier Account)
Students should budget up to $75 in AWS and other cloud services charges for this course.

**Course Schedule/Topics Covered.**

The Network Structures and Cloud Computing course offers a comprehensive exploration of modern cloud technologies and their underlying network structures. The curriculum begins with an introduction to cloud computing, laying the foundation for understanding its core concepts and principles. Students will delve into the world of virtualization and containerization, gaining hands-on experience with these fundamental technologies that power cloud environments.
The course then progresses to cover various cloud service models, (XaaS as a service), as well as different deployment models. This knowledge is complemented by an examination of network fundamentals specifically tailored for cloud computing, ensuring students grasp the interconnected nature of cloud systems.

As the course advances, students will explore cloud storage solutions and databases, learning how to manage and optimize data in distributed environments. A significant portion of the curriculum is dedicated to cloud security and compliance, including identity and access management, preparing students to address the critical challenges of protecting cloud-based assets.

The course also emphasizes practical aspects of cloud computing, such as achieving scalability and elasticity, optimizing performance, and implementing effective disaster recovery and business continuity strategies. Students will learn about DevOps practices and continuous integration/continuous deployment (CI/CD) pipelines, gaining insights into modern software development and deployment processes in cloud environments.

Emerging trends in cloud computing are also covered, including serverless computing and the implementation of multi-cloud and hybrid cloud strategies.

Throughout the course, students will engage with real-world scenarios and hands-on projects, allowing them to apply their knowledge and develop practical skills that are highly valued in the industry. By the end of the course, students will have a robust understanding of cloud computing technologies and the ability to design, implement, and manage cloud-based solutions effectively.

| Week | Date | In Class Topic | Assignment |
|---|---|---|---|
| **1** | 9/1 | No Class | No Class |
| **2** | 9/8 | Course and Syllabus Overview<br>Module 1: Intro to Cloud Computing | 1 - Account Signup |
| **3** | 9/15 | Module 2: Development Environments - Part 1 | 2 - Dev Environment |

| | | | |
|---|---|---|---|
| **4** | 9/22 | Module 3: Development Environments - Part 2 | 3 - Dev Environment Part 2 |
| **5** | 9/29 | Module 4: Cloud Compute and Virtualization<br>**Quiz 1** | 4 - Cloud Compute |
| **6** | 10/6 | Module 5: Infrastructure as Code | 5 - Infrastructure as Code Tools |
| **7** | 10/13 | Holiday: Columbus Day - No Class | No Class |
| **8** | 10/20 | Module 6: CI/CD Pipelines and Testing<br>**Mid-term Exam** | 6 - Automated Testing |
| **9** | 10/27 | Module 7: Domain Name Service | 7 - Using DNS |
| **10** | 11/3 | Module 8: Cloud Storage Solutions | 8 - Backups |
| **11** | 11/10 | Module 9: Cloud Monitoring and Logging | 9 - using CloudWatch |
| **12** | 11/17 | Module 10: Load Balancing and Autoscaling<br>**Quiz 2** | 10 - Load Balancer |
| **13** | 11/24 | Module 11: DevOps and SRE | 11- DevOps |
| **14** | 12/1 | Module 12: Cloud Architecture<br>Final Review | No Assignment |
| **15** | 12/8 | **Final Exam** | |

**Assignment Grading**

You will be graded on the following category of activities, using the percent grade weighting.

| ***Category*** | ***Component*** | ***Percent of Grade*** |
|---|---|---|
| 1 | Quizzes, In-class Discussions, and Attendance | 10% |
| 2 | Project Assignments | 50% |
| 3 | Mid-term Exam | 20% |
| 4 | Final Exam | 20% |
| Total | | 100% |

## Grade Scale

| Percentage Range | Letter Grade | Grade Point Equivalent |
|---|---|---|
| 95.0–100.0% | A | 4.000 |
| 90.0–94.9% | A- | 3.667 |
| 87.0–89.9% | B+ | 3.333 |
| 84.0–86.9% | B | 3.000 |
| 80.0–83.9% | B- | 2.667 |
| 77.0–79.9% | C+ | 2.333 |
| 74.0–76.9% | C | 2.000 |
| 70.0–73.9% | C- | 1.667 |
| 69.9% and Below | F | 0.000 |

There will be quizzes and in-class discussions given during the course. Missed quizzes or in-class discussion will count as zero credit, unless you receive prior written approval of the instructor.

**Incomplete Grades**

An incomplete grade may be reported by the instructor when a student has failed to complete a major component of a required course, such as homework, a quiz or final examination, a term paper, or a laboratory project. Students may make up an incomplete grade by satisfying the requirements of the instructor. Be aware that instructors' policies on the granting of incomplete grades may vary and that the final decision on an incomplete grade is up to the instructor. Instructors may deny requests for an incomplete grade. If the missing assignment(s) have not been submitted to the instructor within 30 days from the end of the term in which the course was offered, or the agreed upon due date, the grade entered will reflect the student's grade in the course for the work completed and the missing assignments receiving no credit toward the final grade.

**Attendance/Late Work Policy**

**Attendance Policy**

In each term, students enrolled in on-ground sections are expected to be on campus and attending class beginning with the first day of classes. Students in online sections are expected to log in and

participate in class beginning with the first day of classes. Students who join a class after the first day of class during the university add period, or who are approved for late registration by the instructor and the Graduate School of Engineering, are responsible for all coursework missed prior to enrolling. In the interest of students' success, the college does not support the arrival of students to class after the university add deadline. Enrolled students who do not attend class during the first week of a semester risk being dropped from the course.

In cases where an enrolled student cannot arrive on campus by the first day of class due to circumstances beyond their control, it is the student's responsibility to contact the instructor for approval and notify the Graduate School of Engineering.

Students registered in MGEN courses (INFO, CSYE, and DAMG) are **allowed a maximum of 2 absences per course, with 3 or more absences resulting in an 'F' for that course**. Course instructors are not expected to make accommodations and students are expected to inform their instructors of any absences in advance of the class. Should a student anticipate being unable to attend 3 or more classes, they should discuss their situation with their Academic Advisor to explore other types of leave and accommodations in accordance with the University's academic and global entry expectations. Students may be asked to share communications about class absences with their Academic Advisor. If a student is sick long-term or experiences a medical issue that prevents class attendance, it is strongly encouraged that they speak with their Academic Advisor (coe-gradadvising@northeastern.edu) to learn more about the Medical Leave of Absence. International students should review the Office of Global Services webpage to understand their visa compliance requirements.

Teaching Assistants (TAs) or Instructional Assistants (IAs) will be present at each class to collect student attendance.

**Late Work Policy**

Students must submit assignments by the deadline in the time zone noted in the syllabus. Students must communicate with the faculty prior to the deadline if they anticipate work will be submitted late. Work submitted late without prior communication with faculty will not be graded and will not receive credit.

**Course Evaluations**

Student feedback on their learning experience is valuable and helps improve future courses. We encourage all students to complete the course evaluation surveys when they become available.

Surveys are distributed at both the midterm mark and the end of the term via email and are completely anonymous and confidential. Any questions about the surveys can be directed to mgen-programs@coe.northeastern.edu

**MGEN Student Feedback**

Students who would like to provide the MGEN unit with anonymous feedback on this particular course, Teaching Assistants, Instructional Assistants, professors, or to provide general feedback regarding their program, may do so using this survey: https://neu.co1.qualtrics.com/jfe/form/SV_cTIAbH7ZRaaw0Ki

**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.

The following is a broad overview, but not an all-encompassing definition, of what constitutes a violation of academic integrity:

**Cheating:** The University defines cheating as using or attempting to use unauthorized materials, information, or study aids in any academic exercise. When completing any academic assignment, a student shall rely on their own mastery of the subject.

**Fabrication:** The University defines fabrication as falsification, misrepresentation, or invention of any information, data, or citation in an academic exercise.

**Plagiarism:** The University defines plagiarism as using as one’s own the words, ideas, data, code, or other original academic material of another without providing proper citation or attribution. Plagiarism can apply to any assignment, either final or drafted copies, and it can occur either accidentally or deliberately. Claiming that one has “forgotten” to document ideas or material taken from another source does not exempt one from plagiarizing.

**Unauthorized Collaboration:** The University defines unauthorized collaboration as instances when students submit individual academic works that are substantially similar to one another. While several students may have the same source material, any analysis, interpretation, or reporting of data required by an assignment must be each individual’s independent work unless the instructor has explicitly granted permission for group work.

**Participation in Academically Dishonest Activities:** The University defines participation in academically dishonest activities as any action taken by a student with the intention of gaining an unfair advantage over other students.

**Facilitating Academic Dishonesty:** The University defines facilitating academic dishonesty as intentionally or knowingly helping or contributing to the violation of any provision of this policy.

Please visit https://osccr.sites.northeastern.edu/academic-integrity-policy/ to access the full academic integrity policy.

**University Health and Counseling Services**

As a student enrolled in this course, you are fully responsible for assignments, work, and course materials as outlined in this syllabus and in the classroom. Over the course of the semester if you experience any health issues, please contact UHCS.

For more information, visit https://www.northeastern.edu/uhcs.

**Student Accommodations/Disability Access Services (DAS)**

Northeastern University and Disability Access Services (DAS) 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 DAS, students must provide documentation of a disability that demonstrates a current substantial limitation. Accommodations are approved based on a review of the information that is submitted and reviews are done on a case-by-case basis.

If the course is conducted in an on-ground (in-person) format, students are expected to attend class physically as scheduled. Professors are not required to provide virtual attendance links unless a student has documented accommodation approved by the Disability Access Services (DAS) office and their Academic Advisor. If a student requires accommodation for remote participation, they must

submit a formal request through the Disability Office and coordinate with their Academic Advisor prior to the course start date. For more information, visit https://disabilityaccessservices.sites.northeastern.edu/

**Office of Global Services**

As an F-1, J-1, or Study Permit student, you must meet certain obligations in order to maintain lawful nonimmigrant status. Maintaining status is necessary in order to retain eligibility for the benefits of F-1 or J-1 status, such as employment authorization and program extension, and can be crucial to a successful application for a change or adjustment of nonimmigrant status in the future. Failure to maintain your nonimmigrant status can result in serious problems with immigration and could lead to deportation from the U.S. or Canada.

Students must maintain on-ground presence throughout the academic term. At Northeastern, there are four different defined instructional methods: Traditional, Hybrid, Live Cast, and Online. Traditional, Hybrid, and Live Cast courses meet the Visas' on-ground presence requirements. Online courses do not meet the Visas' on-ground presence requirements.

Students enrolled in Summer courses should adhere to OGS guidelines on maintaining status during the Summer term.

For more information please visit,
https://international.northeastern.edu/ogs/current-students/understanding-visa-requirements/guidelines-on-maintaining-status/

**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 https://library.northeastern.edu Network Campus Library Services: Northeastern University Library Global Campus Portals

24/7 Canvas Technical Help For immediate technical support for Canvas, call 617-373-4357 or email help@northeastern.edu Canvas Student Resources:
https://canvas.northeastern.edu/student-resources/

For assistance with my Northeastern e-mail, and basic technical support: Visit ITS at https://its.northeastern.edu Email: help@northeastern.edu ITS Customer Service Desk: 617-373-4357

**Outreach, Engagement, Belonging**

Northeastern University is committed to fostering a community of belonging, which is essential to the advancement of Northeastern University's mission of teaching and research. Our university is stronger as a result of the varied backgrounds, experiences, and perspectives that all members of our global community bring to the pursuit of knowledge. Embracing this pluralism is not the work of one office, department, or academic unit. It is a shared responsibility that spans disciplines and boundaries. By harnessing the power of our differences, we will continue to light the path to bold new ideas and life-changing discoveries.

It is my intention that students from all backgrounds and perspectives will be well served by this course, and that the diverse experiences that students bring to this class will be viewed as an asset. I welcome individuals of all ages, backgrounds, beliefs, ethnicities, genders, gender identities, gender expressions, national origins, religious affiliations, sexual orientations, socioeconomic background, family education level, ability – and other visible and nonvisible differences. All members of this class are expected to contribute to a respectful, welcoming and belonging environment for every other member of the class. Your suggestions are encouraged and appreciated. Please visit Belonging at Northeastern – Northeastern Provost for complete information.

**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.

The Office for University Equity and Compliance (OUEC) leads Northeastern University's efforts in maintaining compliance with all federal, state, and provincial civil rights laws and prohibits discrimination within any of its programs, activities, and services. Please visit https://ouec.northeastern.edu/ for more information and for the link to file a report