# CS643 Cloud Computing Syllabus

**Semester**

**Course Modality:**
This is an online course, which will be conducted fully online, asynchronously via Canvas. For more information on using Canvas and other supported learning tools, visit the IST Service Desk Knowledgebase.

**Course Workload:** This course values your time and effort and aims to provide a rewarding learning experience. You can expect to dedicate approximately **7.5 hours** to the course per week. This estimate includes, but is not limited to, time spent on readings, watching course videos, completing projects/quizzes/exams, participating in discussions, and reviewing feedback.

**Instructor Information**

| Instructor | Email | Office Hours |
|---|---|---|
| **Manoop Talasila** | **manoop.talasila@njit.edu** | **Email for an appointment via Zoom.** |

*I will respond to all emails/Inbox messages within 48 business hours. Typically, quizzes, projects, exams, and discussions will be graded within one week of submission.

## General Information

### Course Description

The course presents a comprehensive view of cloud computing, from platforms and services to programming and infrastructure. The topics include: cloud computing platforms, with examples from Amazon Web Services (AWS), Google Cloud, and Microsoft Azure; cloud services for data analytics, artificial intelligence, mobile computing, IoT, edge computing, security and privacy, and devops; programming frameworks for parallel computing in the cloud; distributed storage in the cloud; and virtualization and containerization. The course includes quizzes, programming projects, research paper presentations, and exams. The programming projects will be done in AWS.

## Prerequisites/Co-requisites
CS 644 or DS 644 or CS 656 or ECE 637

## Course Learning Outcomes
By the end of the course, students will be able to:

1. Analyze the trade-offs between deploying applications/services in the cloud and on premises.
2. Compare the advantages and disadvantages of different types of cloud platforms.
3. Deploy applications in public cloud platforms.
4. Program data intensive parallel applications in the cloud.
5. Analyze the performance, scalability, and availability of cloud systems and applications.
6. Identify security and privacy issues in the cloud.
7. Present state-of-the-art cloud research.
8. Identify key concepts and considerations in cloud computing, including deployment options, platform types, performance, scalability, and security.

## Required Materials
**No textbook is required for this class.** Each module is built around research papers, online documentation, and selected websites that cover key topics. These materials serve as reference sources to complement the details presented in the topic videos. Be sure to review all listed websites and readings, as they provide essential context, examples, and supporting information for your learning.

# Grading Policy
NJIT Grading Legend

## Final Grade Calculation
Final grades for all assignments will be based on the following percentages:

| | |
|---|---|
| **Quizzes** | **12%** |
| **Discussions** | **10%** |
| **Projects (Project 1 = 10% Project 2 = 18%)** | **28%** |
| **Research Spotlight** | **10%** |
| **Exams (2 exams at 20% each)** | **40%** |

## Course Work

**Quizzes: (12% of grade)** There will be six multiple-choice quizzes throughout the course. They are meant to help you practice course concepts and prepare for exams.

**Discussion Forums: (10% of grade)** You are expected to participate in biweekly discussion forums in Canvas. When all students participate in a discussion, it creates an active learning environment that will help you better understand the materials and be more

successful in the class. You will post your initial response to the prompt by Friday at 11:59 pm and reply to two classmates (who don't have two replies already) by Sunday at 11:59 pm of the week they are listed.

**Projects:** (**28% of grade**) There will be two individual programming projects. In the first, you will learn how to use the AWS cloud and how to develop an AWS application that uses existing cloud services. In the second, you will learn how to develop AI-enabled parallel applications in the AWS cloud. The projects must be done in Java on Amazon Linux VMs. Python could be used, upon permission from the instructor. In addition to the code submission, there will be a demo presentation for each project. Each project will have one intermediate checkpoint, which will provide opportunities to iterate and revise your work based on instructor/TA feedback. The anonymized best submitted solutions will be posted.

**Research Spotlight (10% of grade)** You will be automatically added to a group for this assignment. You and your group will record a presentation highlighting a state-of-the-art research paper in cloud computing. This assignment includes an intermediate checkpoint, during which you will submit a complete draft for instructor feedback. Each student in the group must contribute to a portion of the final presentation. After presentations are posted, the instructor will pose questions to each group, and classmates are required to ask questions on one other group's presentation. Grades will be based on the quality of the presentation, the relevance of the questions posed, and the group's responses.

**Exams (40% of grade)** There will be two oral online exams: a midterm and a final exam. The final exam will cover only the material taught after the midterm.

## Feedback

Students will receive feedback within the discussion forums, the comments feature in Canvas, and optional individual meetings during office hours.

## Letter to Number Grade Conversions

| | |
|---|---|
| A | 75-100 |
| B+ | 65-74 |
| B | 55-64 |
| C+ | 48-54 |
| C | 41-47 |
| F | 0-40 |

This advanced CS course is designed to challenge you beyond your limits and help you achieve more than you thought possible. As a result, absolute scores in this class may be lower than in other courses by design (e.g., the class average could be 60). However, this will not impact your letter grade, as shown in the table above. At the instructor's discretion, grading may be curved to align with the department's guidelines.

## Exam Information and Policies

The exams will be done individually and orally, similar to an interview. Both exams are closed book (i.e., papers, notes, etc.), and students are not allowed any online access during the exams, except for the locked-down browser.

## Policy for Missed Exams/Quizzes and Late Work

In case of missing an exam or quiz, a make-up may be taken only after providing written documentation to the Dean of Students. No late work will be accepted, but at the discretion of the instructors, deadlines may be extended due to unforeseen events.

## Academic Integrity

*"Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your*

*educational investment by knowing and following the NJIT academic code of integrity policy.*

*Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university. If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu"*

### Generative AI

The students are allowed to use generative AI tools for the programming projects and research paper presentations, but they are required to acknowledge this use and explain how they used the AI tools. For quizzes and exams, no AI tools or other online/offline tools and materials are allowed.

### Netiquette

*Throughout this course, you are expected to be courteous and respectful to classmates by being polite, active participants. You should respond to discussion forum assignments in a timely manner so that your classmates have adequate time to respond to your posts. Please respect opinions, even those that differ from your own, and avoid using profanity or offensive language.*

### Weekly Expectations

This course is organized by weekly modules. Each week, students must watch videos, complete readings, assignments, discussions, and/or quizzes.

## Course Schedule

| Module | Topic | Assignment | Due Date |
|---|---|---|---|
| **M1** | **Course overview - Introduction to Cloud Computing** | 1. Introduce Yourself!<br>2. M1 Discussion<br>3. Practice Quiz | 1. Initial post Thursday, reply to classmate Sunday<br>2. Initial post Thursday, reply to classmate Sunday<br>3. Sunday |
| **M2** | **Cloud Platforms I: Infrastructure as a Service (IaaS), AWS** | 1. M2 Quiz | 1. Sunday |
| **M3** | **Cloud Platforms II: IaaS Management. Platform as a Service (PaaS)** | 1. M3 Discussion | 1. Initial post Thursday, reply to classmate Sunday |
| **M4** | **Cloud Platforms III: Serverless Computing; Function as a Service (FaaS)** | 1. M4 Quiz | 1. Sunday |
| **M5** | **Cloud Services I: Data Analytics and Artificial Intelligence** | 1. Project 1 Checkpoint<br>2. M5 Discussion | 1. Monday |

| | | | |
|---|---|---|---|
| | | | 2. Initial post Thursday, reply to classmate Sunday |
| **M6** | **Cloud Services II: Mobile, IoT, and Edge Computing** | 1. Project 1<br>2. M6 Quiz | 1. Sunday<br>2. Sunday |
| **M7** | **Cloud Services III: Security and Privacy, Devops** | 1. Midterm | 1. Saturday |
| **M8** | **Parallel Programming in the Cloud I: Google's MapReduce, Apache's Hadoop, Yahoo's Pig Latin** | 1. M8 Discussion | 1. Initial post Thursday, reply to classmate Sunday |
| **M9** | **Parallel Programming in the Cloud II: Apache's Spark, Storm and Zookeeper** | 1. M9 Quiz | 1. Sunday |
| **M10** | **Cloud Storage Systems I: Google's GFS and BigTable** | 1. Checkpoint: Research Spotlight Draft<br>2. M10 Discussion | 1. Wednesday<br>2. Initial post Thursday, reply to classmate Sunday |
| **M11** | **Cloud Storage Systems II: Amazon's Dynamo and Other Cloud Databases** | 1. Research Spotlight Presentation<br>2. M11 Quiz | 1. Friday<br>2. Sunday |
| **M12** | **Virtualization I: VMWare, XEN, Live VM Migration** | 1. Project 2 Checkpoint<br>2. M12 Discussion | 1. Friday<br>2. Initial post Thursday, reply to classmate Sunday |
| **M13** | **Virtualization II: Containerization, Docker, Kubernetes** | 1. M13 Quiz | 1. Sunday |
| **M14** | **Putting it all together: using the cloud in real-life** | 1. M14 Discussion<br>2. Project 2 | 1. Initial post Thursday, reply to classmate Sunday<br>2. Sunday |
| **M15** | **Final Exam** | 1. Final exam | 1. Saturday |

## Additional Information and Resources

### Accessibility:

This course is offered through an accessible learning management system. For more information, please refer to Canvas's Accessibility Statement.

### Requesting Accommodations:

The Office of Accessibility Resources and Services works in partnership with administrators, faculty, and staff to provide reasonable accommodations and support

services for students with disabilities who have provided their office with medical documentation to receive services.

If you are in need of accommodations due to a disability, please contact the Office of Accessibility Resources and Services to discuss your specific needs.

### Resources for NJIT Online Students

NJIT is committed to student excellence. To ensure your success in this course and your program, the university offers a range of academic support centers and services. To learn more, please review the “Student Services” page in Canvas, which includes information related to technical support.

# Respondus LockDown Browser

This course will be utilizing:

- LockDown Browser: A locked browser used to prevent students from printing, copying, going to another URL, or accessing other applications during an assessment in Canvas.
- Monitor: Used in conjunction with LockDown Browser, Monitor is the usage of a webcam to record a user during the exam session.

If virtual machine software is detected on your device, you won't be able to run LockDown Browser, and you'll receive a warning, "The browser can't be used in virtual machine software such as Virtual PC, VMWare, and Parallels." You can find examples of VM software and troubleshooting steps on Respondus's FAQ page for this topic.

If you want to take your exam on your iPad, you must ask your instructor to enable this feature from within the course settings and download the LockDown Browser app.

For information about Repondus’s privacy policies, please visit their Privacy Center.

The link for downloading the LockDown browser will be provided by the instructor. If the instructor does not provide a link, please reach out to them. Instructors should either reach out to help.njit.edu to receive the link if they do not currently have it.

In using LockDown Browser, students need:

- High-speed internet connection
- Windows or Apple Operating System

In using Monitor or Live Proctoring, students need:

- Webcam (internal or external)
- Microphone and Audio (internal or external)
- NJIT ID or Photo-Issued ID
- To perform an environment check

Helpful Resources:

- Introduction to Respondus LockDown Browser for Students Video
- Respondus Monitor Resources
- Respondus Computer Requirements
- Questions or Problems? Contact:
    - Respondus Live Chat
    - IST Service Desk: 973-596-2900 or Help.njit.edu

**Using LockDown Browser with "Classic" Quizzes in Canvas**

To access a Classic Quiz in Canvas using LockDown Browser, students must:

1. Download and install the LockDown Browser link.
2. Locate the "LockDown Browser" shortcut on your desktop and double-click it. (For Mac users, launch "LockDown Browser" from the Applications folder.)
3. Log in with your NJIT UCID and password.
4. Click on the course within your "Courses" list in which you have to take the exam that requires LockDown Browser.
5. After you enter the course, find the exam and click on it.
6. Click the "Take the Quiz" button. Once a quiz has been started with LockDown Browser, you cannot exit until the "Submit Quiz" button is clicked.
7. If you are required to use a webcam (Respondus Monitor), you will be prompted to complete a Webcam Check and other Startup Sequence steps.