IT 342 - Introduction to Networking Technology
Course Syllabus
Instructor
Section 101

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Office Hours:
- Monday
- 8:30 am - 4:30 pm (remote only)
- Tuesday & Thursday: 10 - 11:30 am, 3 - 5 pm

*Office Hours subject to change (typically with advance notice)

Please put IT 342 and the course section in the subject of your email. This will ensure I respond more quickly to your email.

Tutoring: See Canvas for ACM and YWCC mentoring programs by visiting https://computing.njit.edu/tutoring.

Canvas: Additional material and resources is found on the Canvas class website, (https://canvas.njit.edu). It will be updated as the course progresses and contains the most recent information.

Schedule : *Thursdays from 6pm - 8:50pm in Kupfrian Hall, Room 108*

Course Description: IT 342 is a mid-level course that will illustrate the fundamentals of Cloud Computing and Cloud Administration. Students will learn about industry-standard Cloud environments, cloud storage, compute engine, cloud networking, identity and access management (IAM), billing, and security. Applications built within the cloud will also be covered. Students will also learn to operate industry-standard applications such as AWS and Docker Desktop to create their own cloud applications.

Prerequisites: IT 120 - Networking knowledge is essential to this course, as many commands will be used to manage multiple containers connected to each other via VLAN. This course and the project will assume you know the basics of how networks function.
        Note: Prior coding knowledge is beneficial, but not required. AI knowledge is encouraged!

Course Requirements
        To complete the labs and project for this course, you must have access to, and administrative rights on, a computer that meets the NJIT minimum baseline computer system standards. You can find a listing of the minimum computing requirements under 'Ying Wu College of Computing' at https://ist.njit.edu/student-computers-recommended-specs.

        We will be using Amazon Web Services (AWS), Docker Desktop, and/or OpenNebula to create virtual container instances and manage them in the cloud. Though containers are typically more lightweight than full VMs and most operations will be performed on the cloud, student laptops should be capable of running up to 4 VM instances at once. Please note that students are responsible for the administration/maintenance of their own computer. This includes any software loaded onto it for this course. While I will provide help with problems when I have time available, responsibility for resolving problems remains with the student.

Calendar

Day	Lecture	Lab
Week 1 **September 2, 4**	**Introduction** - Icebreaker - What is the cloud? - IaaS, SaaS	**AWS Setup** - Set up AWS account - Explore console - Create first EC2 instance - Terminate safely
Week 2 **September 9, 11**	**Linux Fundamentals** - Linux command line essentials - File permissions and ownership - Process management - SSH and remote access	**Linux/SSH Practice** - Connect to EC2 instance via SSH - Basic Linux commands Configure users and permissions
Week 3 **September 16, 18**	**Identity and Access Management** - Users, groups, and roles - Policies and permissions - Multi-factor authentication - Security best practices	**IAM Practice** - Create IAM users and groups - Assign policies - Set up MFA - Create service roles
Week 4 **September 23, 25**	**EC2 Deep Dive** - Amazon Machine Instances (AMIs) - Security groups - Network Access Control Lists (NACLs) - Elastic IPs and placement groups	**Playing with AWS** - Create custom AMIs - Configure security groups - Use Elastic IPs
Week 5 **September 30**	**Storage Solutions** - Elastic Block Store (EBS) - S3 storage - Elastic File System (EFS) - Security and encryption	**Applying Storage** - Attach and mount EBS volumes - Create S3 buckets with lifecycle polic - Set up cross-region replication
Week 6 **October 7, 9**	**Introduction to Docker** - Containerization concepts - Docker architecture - Images vs containers - Dockerfile basics	**Docker Setup** - Install Docker on EC2 - Create first container - Build custom image with Dockerfile - Push to Docker Hub
Week 7 **October 14, 16**	**Docker Advanced Concepts** - Docker networking - Volume management - Multi-container applications - Docker Compose	*Midterm Review* **Project Briefing** - Trello Setup - Groups (if desired)
Week 8 **October 20-24**	**==Midterm Exam (Lectures 1 - 7)==** *Makeup exam is available by appointment*	
Week 9 **October 28, 30**	**AWS Container Services** - Elastic Container Service (ECS) - Elastic Container Registry (ECR) - Fargate vs EC2	**AWS Container Practice** - Push images to ECR - Create ECS cluster

	- Container orchestration concepts **Project Proposal Due**	- Deploy containerized app on ECS with Fargate
Week 10 **November 4, 6**	**Virtual Private Clouds (VPC)** - VPC components and design - Subnets, route tables, gateways - NAT instances vs NAT gateways - VPC peering and endpoints	**Configuring VPCs** - Design and implement custom VPC with public/private subnets - Configure routing - Set up NAT gateway **Project Milestone - Front End and Github repository**
Week 11 **November 11, 13**	**Load Balancing and Auto Scaling** - Application Load Balancer (ALB) - Network Load Balancer (NLB) - Groups and health checks - Auto Scaling Groups - Launch templates and scaling policies	**Load Balancing Practice** - Set up ALB with multiple targets - Create Auto Scaling Group with scaling policies - Test load balancing
Week 12 **November 18, 20**	**Database Services** - RDS vs DynamoDB - Multi-AZ deployments and read replicas - Database security - Backup strategies - ElastiCache	**Database Setup** - Deploy RDS with Multi-AZ - Create read replica - Set up DynamoDB table - Implement caching with ElastiCache **Project Milestone - Database and Login**
Week 13 **December 2, 4**	**Monitoring and Logging** - CloudWatch metrics and alarms - CloudWatch Logs and log groups - AWS CloudTrail for auditing - SNS for notifications	**CloudWatch Practice** - Create CloudFormation template for multi-tier application - Use AWS CLI for automation - Deploy infrastructure with Terraform
Week 14 **December 9, 11**	**Final Review**	**Project End - VLAN and full site functionality**
Week 15 **December 15- 20**	**Final Exam (Lectures 8 - 12)** *Makeup exams are **NOT** available*	

*Note: Schedule is subject to change. Refer to Canvas for the most recent information.

Grading Policy

Final grades will be based on:

Labs	20%	A	*100% - 90%*
Midterm	25%	B+	*85% - 89%*
Final	30%	B	*80% - 84%*

Project Milestones (3)	25%		C+	*75% - 79%*
TOTAL	**100%**		C	*70% - 74%*
			F	*0% - 65%*

Grading Policy (cont.)

The Midterm and Final are subject to curving based on the following rules:

- Any questions that a majority of the class gets wrong will become extra-credit instead of applying to your score.
- I will always round up to the higher tier grade based on your grade decimal percentage. (Ex. An 89.5%, will be rounded up to an A instead of a B+)

 I will not assign incompletes unless there are extraordinary circumstances.

Project

Students will create a simulated full-stack environment via creating 4 VM instances all connected via VLAN. This will be a cloud based IaaS environment that will be administered by the students.

Students will create a Project Proposal that illustrates the following:
- Name of the Project
- What type of website/service will be created
- The purpose of this website/service
- An image/drawing of a login page.

Based on their project proposal, deliverables will be given for students to complete over the course of 7 weeks. In addition to completing these deliverables, students must meet general project milestones and track their progress via Trello. Grades will be based on Milestone Completion, Trello board organization, and the ability to explain/present your project upon being asked.

Project Milestones will be explained later in the semester. AI usage is encouraged! Students are encouraged to use AI to generate front-end webpages and databases, in addition to assisting with their proposal.

Participation (Attendance)

Unlike most courses, attendance will not be taken. I will note if you are present, but your attendance does not affect your grade. Life happens, and we all learn in different ways. It is up to your discretion whether you come to lectures or not. I **strongly encourage** you to attend lectures and/or office hours, but they are not mandatory. Labs can be completed via Canvas and on your own PCs; labs offer on-campus resources that can be linked to your PC for the purpose of portability.

 All quizzes will be **in-person and on paper**. If you miss one, you may ask for a make-up quiz during office hours up to two weeks after the initial quiz. Make-exams can be scheduled during my Office hours, and can be scheduled outside of office hours upon request.

Final Exam Attendance is MANDATORY, no exceptions. There will be no make-up exams for the final.

The Golden Rule: I will work with you if you work with me. We're all professionals here. :)

Academic Integrity Policy

"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 academic code of integrity policy that is found at:

http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf.

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"

All your assignments must constitute original work. These assignments may **NOT** be done in collaboration with anyone else (unless otherwise approved). No credit will be given for any assignment that is copied—in part or in its entirety—from another person. **Both people involved will receive no credit.**

Note, however, that you may "talk" about assignments with each other, but such discussions must remain at a conceptual level. In summary, keep in mind:

Do NOT ask to see another person's assignment, particularly a finished assignment.

Do NOT pass your assignment around to other members of the class.

Do NOT submit duplicate assignments. Even partially duplicate assignments will NOT be accepted.

If the instructor is at all **uncomfortable about the originality of your work**, no credit will be given.

Do NOT submit an assignment used for previous assignments in this or other courses.

TURNITIN Policy

NJIT uses Turnitin.com, a service that helps prevent plagiarism on student papers. I will be using the Turnitin.com service at my discretion to determine the originality of student work. If I submit your work to Turnitin.com, it will be stored by Turnitin.com in their database as long as their service remains in existence. If you object to this storage, **you must let me know no later than two weeks after the start of this semester.** Note, I may utilize other services and techniques to check for plagiarism and inappropriate AI usage.

AI Usage Policy (Standard):

Policies for the usage of AI language models tools, such as ChatGPT, to generate new content are as follows:
- You must use AI-assisted tools for learning responsibly alongside your critical thinking and writing skills
- To generate content as a starting point to inform **your** work, brainstorm ideas, and prepare notes for **your** writings just as you do with your textbooks, library resources, and web materials.
- AI-generated text in submitted assignments must use quotation marks and be appropriately cited.
- Make sure the information provided is factual
- Such tools **must not write a significant portion** of your essays or assignments. This behavior is considered cheating.

Student Absences for Religious Observations

NJIT is committed to supporting students observing religious holidays. Students must notify their instructors in writing of any conflicts between course requirements and religious observances, ideally by the end of the second week of classes and no later than two weeks before the anticipated absence. All instructors must include a reminder on the course syllabus about this notification process.

All instructors are required to provide academically reasonable accommodations, allowing students to complete missed assignments, exams, quizzes, or other coursework within the term. Instructors are encouraged to consider the NJIT religious holiday calendar and exercise cultural

sensitivity when scheduling assessments or major assignments. You may find the NJIT religious holiday calendar at https://www.njit.edu/inclusive/religious-and-spirituality-resources.

All instructors must ensure that students are not penalized for properly documented absences and maintain confidentiality regarding religious observances. For questions or additional guidance, please review the NJIT religious observances policy at https://www.njit.edu/registrar/njit-policy-student-absences-religious-observances or contact the Office of Inclusive Excellence at inclusiveexcellence@njit.edu.