Course Syllabus

Course Code:	IT4B (SCAT)
Course Name:	Server, Cloud, and Automation Technologies
Course Length:	40 days

Course Description

In this course, students learn how to deploy and manage servers, both on-premises and within a cloud environment. More specifically, students learn how to provision servers, automate server deployment and configuration, leverage online and AI tools to generate automation scripts, as well as manage virtual machines and containerized applications using open source frameworks and technologies. Furthermore, this course covers the concepts tested on the CompTIA Server+ and Cloud+ certifications.

Course Learning Outcomes

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

1. Detail the tools and tasks used to administer servers within on-premises and cloud environments.
2. Outline the storage, fault tolerance, and security technologies used within on-premises and cloud server environments.
3. Describe the tools and process used to implement a devops workflow within a cloud environment.
4. Identify the procedure used to automate the configuration of on-premises and cloud servers.
5. Deploy, configure, and optimize on-premises and cloud servers.
6. Configure on-premises and cloud server storage, and fault tolerance.
7. Implement security for on-premises and cloud server environments.
8. Configure a devops workflow for continuous deployment using Kubernetes.
9. Use Ansible to automate the configuration of on-premises and cloud servers.
10. Leverage online and AI tools to generate Ansible automation scripts.

Materials and Resources

Textbooks:	Book 1: McMillan, Troy. (2022). CompTIA Server+ Study Guide: Exam SK0-005 (2e). Sybex. Book 2: Freeman, J. and Keating, J. (2021). Mastering Ansible (4e). Packt. Book 3: Yilmaz, O. and Akbas, S. (2019). Introduction to DevOps with Kubernetes. Packt. Book 4: Piper, B. (2021). CompTIA Cloud+ Study Guide: Exam CV0-003 (3e). Sybex.
Software:	Windows 10 or 11 (Professional or Enterprise/Education), Proxmox VE, Windows Server 2019 or 2022, Ubuntu Linux, Fedora Linux, Ansible, Kubernetes, Oracle Cloud Infrastructure

Course Format

Lecture:
Knowledge transfer of concepts and practices will be done using PowerPoint presentations and/or the whiteboard, as well as software walkthroughs and demonstrations. Lectures go beyond simple reiteration of the text or slides; information is contextualized with the use of examples. Topics and outcomes are the driving force of the lectures.

Discussion:
Points of discussion are interspersed throughout the course to keep you engaged with the material. Participation is encouraged, and the instructor is responsible for keeping discussions on track.

Activities/Exercises:
Short exercises will be used to explore concepts addressed in the lesson. Suggested extra activities are listed for each day.

Supervised Lab:
You will have the opportunity to gain hands-on experience through supervised lab activities.

Class Preparation:
Review the class lectures to become familiar with the primary concepts before addressing them in-depth in class. Instructors assume you are prepared and will only cover the most important topics during class time.

Evaluation Breakdown

Quizzes:

- There are 6 Brightspace quizzes. They are worth 30% of the final grade. These quizzes will be performed on Mondays.

Final Projects:

- At the end of the course, you will complete a final project in which you will design, provision, monitor, and document a private cloud environment. This project is worth 60% of your final grade.

Professional Performance:

- Professional performance includes attendance, punctuality, participation in class, completion of all assignments, and class preparation. Professional performance is worth 10% of the final grade.

Evaluation Scale

A+	90–100 %	
A	80–89	
B+	75–79	
B	70–74	
B-	65–69	
C+	60–64	Pass Mark for triOS College
C	55–59	
C-	50–54	
D	40–49	
F	0–39	

Please Note: The pass mark for triOS College is 60%.

Students who miss tests or a final project submission due to medical reasons and can provide a doctor's note, will be given a chance to resubmit at a later date.

The consequence of submitting a plagiarized, purchased, or in any manner inappropriately negotiated or falsified test, project, or any evaluated material, is a grade of zero on the material.

Getting Additional Help

An optional student-focused, instructor-led study lab is open to all IT students that need assistance outside of normal class hours. This lab runs from 1:00pm - 5:00pm, Monday to Friday in Microsoft Teams and will be facilitated by IT instructor Glenn Lankin.

To locate and join this Team, open your Teams app and navigate to **Teams** > **Join or create team** > **Join team**, and enter **Instructor-Led IT Study Lab** in the search dialog box, or click on this direct link.

Daily Plan at a Glance

	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
Lecture	Server Hardware	Creating a Proxmox Infrastructure	Installing and Configuring Servers (Part 1)	Installing and Configuring Servers (Part 2)	Server Maintenance
Activity	Book 1 Ch.1 Specing Server Hardware	Proxmox Deployment	Book 1 Ch.2 Proxmox VM Deployment (Windows and Linux guests)	Book 1 Ch.2 Baselining, Logs, and Remote Access	Book 1 Ch.3 Proxmox Container Deployment
	DAY 6	**DAY 7**	**DAY 8**	**DAY 9**	**DAY 10**
Lecture	Storage Technologies and Fault Tolerance	Server, Data, and Network Access Security	Networking and Disaster Recovery	Troubleshooting	Ansible Concepts and Architecture
Activity	Book 1 Ch.4 and 5 Proxmox Storage Configurations and NIC Teams Quiz #1	Book 1 Ch.6 and 7 Proxmox Firewall, User, Role, and 2FA Configuration	Book 1 Ch.8 and 9 Proxmox SDNs, Backup Options, and Scripting	Book 1 Ch.10-12 Proxmox Monitoring and Troubleshooting Options	Configure SSH, Deploy Ansible

	DAY 11	DAY 12	DAY 13	DAY 14	DAY 15
Lecture	Working with Basic Playbooks	Ad-hoc Ansible Commands Using Variables	Pre-Tasks, Post-Tasks, and Handlers Recap and Mastering Ansible	Protecting Secrets	Ansible and Windows
Activity	Creating and Running Ansible Playbooks Quiz #2	Ad-hoc Commands, Apache Deployment Playbook	Book 2 Ch.1 and 2 LAMP Deployment Playbook	Book 2 Ch.3 Using Ansible Vault to Protect Secrets	Book 2 Ch.4 Creating Windows Playbooks
	DAY 16	**DAY 17**	**DAY 18**	**DAY 19**	**DAY 20**
Lecture	AWX, Jinja2, and Controlling Task Conditions	Reusable Ansible Content	Troubleshooting and Network Automation	Ansible GitOps	Introduction to DevOps and Microservices
Activity	Book 2 Ch.5-7 Enhancing Playbook Logic Quiz #3	Book 2 Ch.8 Working with Imports and Roles	Book 2 Ch.9, 13 Troubleshooting Options in Ansible	Migrating our Ansible Code to GitHub	Book 3 Ch.1 and 2 Exploring Container Builds

	DAY 21	DAY 22	DAY 23	DAY 24	DAY 25
Lecture	Introduction to Kubernetes Creating a Kubernetes Cluster	Kubernetes Cloud App Deployment	Scaling and Updating Cloud Apps	Adding Cluster Components and Trouble-shooting	Additional Configuration Graphical Monitoring and Management
Activity	Book 3 Ch.3 and 4 Deploying Kubernetes Quiz #4	Book 3 Ch.5 Kubernetes Deployments, Services, and Ingress	Book 3 Ch.7 Pod Scaling and Updating	Book 3 Ch.8 Helm Charts and Pod Trouble-shooting	Book 3 Ch.6 and 9 ConfigMaps, Storage, Prometheus, Grafana, and Lens
	DAY 26	DAY 27	DAY 28	DAY 29	DAY 30
Lecture	Cloud Configurations and Deployments OCI: Getting Started	OCI: Compute, VCN, and Cloud Shell	OCI: Load Balancers, Container Registry, OKE, Functions, and Costs	OCI: Block, Object, Archive, and File Storage	Cloud Security OCI: Keys, WAF, and IAM
Activity	Book 4 Ch.1 and 2 Oracle Cloud Enrollment Quiz #5	VMs, VCNs, SLs, NSGs, and Cloud Shell	Additional VM, Load Balancer Configuration	Block, Object, Archive, and File Storage	Book 4 Ch.3 and 4 IAM, Compartments, and Policies

	DAY 31	DAY 32	DAY 33	DAY 34	DAY 35
Lecture	Reliability and Maintenance OCI: DNS, Traffic Steering, SLAs, and Availability	Cloud Management OCI: Hybrid Connectivity, Data Migration, Resource Manager, and Monitoring	Cloud Troubleshooting OCI: Database, Streaming and Events Services MSSQL vs OracleDB	Start Final Project	Final Project
Activity	Book 4 Ch.5 and 6 DNS Zones and Traffic Steering Policies	Book 4 Ch.7 and 8 Terraform, OCI Metrics	Book 4 Ch.9 and 10 Oracle Autonomous Database	Final Project	Final Project
	DAY 36	**DAY 37**	**DAY 38**	**DAY 39**	**DAY 40**
Lecture	Final Project Quiz #6	Final Project	Final Project	Final Project	Final Project Due
Activity	Final Project	Final Project	Final Project	Final Project	Final Project

Daily Plan Summary

Day 1:

Topics:	Server Hardware
Activities:	Specing Server Hardware
Readings:	Book 1 Chapter 1

Day 2:

Topics:	Creating a Proxmox Infrastructure
Activities:	Proxmox Deployment
Readings:	N/A

Day 3:

Topics:	Installing and Configuring Servers (Part 1)
Activities:	Proxmox VM Deployment (Windows and Linux guests)
Readings:	Book 1 Chapter 2

Day 4:

Topics:	Installing and Configuring Servers (Part 2)
Activities:	Baselining, Logs, and Remote Access
Readings:	Book 1 Chapter 2

Day 5:

Topics:	Server Maintenance
Activities:	Proxmox Container Deployment
Readings:	Book 1 Chapter 3

Day 6:

Topics:	Storage Technologies and Fault Tolerance
Activities:	Proxmox Storage Configurations and NIC Teams
Quizzes:	Quiz #1 (Week 1 Topics)
Readings:	Book 1 Chapter 4 and 5

Day 7:

Topics:	Server, Data, and Network Access Security
Activities:	Proxmox Firewall, User, Role, and 2FA Configuration
Readings:	Book 1 Chapter 6 and 7

Day 8:

Topics:	Networking and Disaster Recovery
Activities:	Proxmox SDNs, Backup Options, and Scripting
Readings:	Book 1 Chapter 8 and 9

Day 9:

Topics:	Troubleshooting
Activities:	Proxmox Monitoring and Troubleshooting Options
Readings:	Book 1 Chapter 10-12

Day 10:

Topics:	Ansible Concepts and Architecture
Activities:	Configure SSH, Deploy Ansible
Readings:	N/A

Day 11:

Topics:	Working with Basic Playbooks
Activities:	Creating and Running Ansible Playbooks
Quizzes:	Quiz #2 (Week 2 topics)
Readings:	N/A

Day 12:

Topics:	Ad-hoc Ansible Commands Using Variables
Activities:	Ad-hoc Commands, Apache Deployment Playbook
Readings:	N/A

Day 13:

Topics:	Pre-Tasks, Post-Tasks, and Handlers Recap and Mastering Ansible
Activities:	LAMP Deployment Playbook
Readings:	Book 2 Chapter 1 and 2

Day 14:

Topics:	Protecting Secrets
Activities:	Using Ansible Vault to Protect Secrets
Readings:	Book 2 Chapter 3

Day 15:

Topics:	Ansible and Windows
Activities:	Creating Windows Playbooks
Readings:	Book 2 Chapter 4

Day 16:

Topics:	AWX Jinja2 Controlling Task Conditions
Activities:	Enhancing Playbook Logic
Quizzes:	Quiz #3 (Week 3 topics)
Readings:	Book 2 Chapter 5-7

Day 17:

Topics:	Reusable Ansible Content
Activities:	Working with Imports and Roles
Readings:	Book 2 Chapter 8

Day 18:

Topics:	Troubleshooting Network Automation
Activities:	Troubleshooting Options in Ansible
Readings:	Book 2 Chapter 9 and 13

Day 19:

Topics:	Ansible GitOps
Activities:	Migrating our Ansible Code to GitHub
Readings:	N/A

Day 20:

Topics:	Introduction to DevOps and Microservices
Activities:	Exploring Container Builds
Readings:	Book 3 Chapter 1 and 2

Day 21:

Topics:	Introduction to Kubernetes Creating a Kubernetes Cluster
Activities:	Deploying Kubernetes
Quizzes:	Quiz #4 (Week 4 topics)
Readings:	Book 3 Chapter 3 and 4

Day 22:

Topics:	Kubernetes Cloud App Deployment
Activities:	Kubernetes Deployments, Services, and Ingress
Readings:	Book 3 Chapter 5

Day 23:

Topics:	Scaling and Updating Cloud Apps
Activities:	Pod Scaling and Updating
Readings:	Book 3 Chapter 7

Day 24:

Topics:	Adding Cluster Components Troubleshooting
Activities:	Helm Charts and Pod Troubleshooting
Readings:	Book 3 Chapter 8

Day 25:

Topics:	Additional Configuration Graphical Monitoring and Management
Activities:	ConfigMaps, Storage, Prometheus, Grafana, and Lens
Readings:	Book 3 Chapter 6 and 9

Day 26:

Topics:	Cloud Configurations and Deployments OCI: Getting Started
Activities:	Oracle Cloud Enrollment
Quizzes:	Quiz #5 (Week 5 Topics)
Readings:	Book 4 Chapter 1 and 2

Day 27:

Topics:	OCI: Compute, VCN, and Cloud Shell
Activities:	VMs, VCNs, SLs, NSGs, and Cloud Shell
Readings:	N/A

Day 28:

Topics:	OCI: Load Balancers, Container Registry, OKE, Functions, and Costs
Activities:	Additional VM and Load Balancer Configuration
Readings:	N/A

Day 29:

Topics:	OCI: Block, Object, Archive, and File Storage
Activities:	Block, Object, Archive, and File Storage
Readings:	N/A

Day 30:

Topics:	Cloud Security OCI: Keys, WAF, and IAM
Activities:	IAM, Compartments, and Policies
Readings:	Book 4 Chapter 3 and 4

Day 31:

Topics:	Reliability and Maintenance OCI: DNS, Traffic Steering, SLAs, and Availability
Activities:	DNS Zones and Traffic Steering Policies
Readings:	Book 4 Chapter 5 and 6

Day 32:

Topics:	Cloud Management OCI: Hybrid Connectivity, Data Migration, Resource Manager, and Monitoring
Activities:	Terraform and OCI Metrics
Readings:	Book 4 Chapter 7 and 8

Day 33:

Topics:	Cloud Troubleshooting OCI: Database, Streaming, and Events Services MSSQL vs OracleDB
Activities:	Oracle Autonomous Database
Readings:	Book 4 Chapter 9 and 10

Day 34-35:

Topics:	Final Project
Activities:	Final Project

Day 36:

Topics:	Final Project
Activities:	Final Project
Quizzes:	Quiz #6 (Week 6 and 7 Topics)

Day 37-40:

Topics:	Final Project
Activities:	Final Project

Instructor and Student Role Expectations

College instructors are strongly committed to seeing students achieve the learning objectives of each course within a program.

As your instructor, I will:

- Encourage contact between students.
- Develop reciprocity and cooperation among students.
- Encourage active learning.
- Give prompt feedback.
- Emphasize time-on-task.
- Communicate high expectations.
- Respect diverse talents and ways of learning.

In return, it is expected that you will uphold certain values and behaviours, maintaining a productive learning environment for everyone in class.

As a student, you will:

- Arrive on time prepared to engage in the work of the class (for example, taking notes, participating in group discussion and activities, and so on.)
- Stay alert and participate throughout class.
- Avoid talking with your peers while the instructor or other students are speaking.
- Be courteous and act with decorum toward your peers and anyone who may be in class facilitating the learning process.
- Ask questions and participate in discussion but raise your hand before doing so.
- Submit assignments or other work on the date it is due. Exceptions are made only for extraordinary situations and with the approval of the instructor.
- Turn off cellphones, pagers, radios, and other such electronic devices during class. Exceptions are permitted only with the instructor's prior consent.

Policies and Procedures

For full details, please see the Student Handbook.

Attendance Policy

Attendance is a mandatory requirement of all provincial education departments and the College. All students are expected to attend each scheduled class and are responsible for fulfilling course requirements they missed during an absence. It is the responsibility of the student to notify the College if they are going to be absent. This should be done prior to the start of class.

For specific policies and procedures regarding absences, attendance, and disciplinary measures, please refer to your Student Handbook.

Academic Integrity

Academic integrity is the core value at the College. The five values most often associated with academic integrity include:

- Honesty
- Trust
- Fairness
- Respect
- Responsibility

Academic integrity is the commitment to support these five values, even in the face of adversity. Just as your personal sense of integrity makes a statement about you as an individual, your attitude toward learning defines you.

Good students do not cheat or cut corners. They take responsibility for managing their own learning so that they become lifelong learners. The level of academic integrity a student demonstrates is measured by the amount of energy, effort, and focus that student is willing to put into their learning.

Academic dishonesty includes, but is not limited to:

- Cheating on assignments, quizzes, and exams by copying another student's work or by using unauthorized resources during a quiz or exam.
- Plagiarism — unauthorized use or close imitation of the language and thoughts of another author and misrepresenting the work as one's own. Development projects must not plagiarize code outside any frameworks and code-reuse must be approved by the instructor.
- Purchasing, selling, or sharing quizzes, exams, projects, and assignments.
- Use of unlicensed software.
- Talking during exams.

For specific policies and procedures regarding cheating, appealing grades, and disciplinary measures, please refer to your Student Handbook.