VAAL UNIVERSITY OF TECHNOLOGY

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LEARNER GUIDE

Faculty	Engineering and Technology
Department	Electrical Engineering
Course	Computer Systems
Title	Operating Systems 3
Compiled By	KT Nshimba
Year	2024
NQF Level	6
Credits	SAQA (10) / ECSA (9.5)

Operating Systems 3

1. COURSE OBJECTIVE:

This module tries to bring together lessons from networks and other operating systems modules to help students understand how to manage cloud-based resources. You will be able to create and manage various resources, provide authentication and authorization, deploy virtual machines and virtual network, and work with scenarios that can help you understand how this information can be applied in a real world. Although the course does not cover all the cloud vendors, the principles and lessons covered should be able to help you understand cloud administration in general.

2. SYLLABUS CONTENT:

- Azure Active Directory
- Compliance and Cloud Governance
- Virtual Networking
- Intersite Connectivity
- Network Traffic Management
- Azure Storage
- Azure Virtual Machines
- Automation, Deployment, and Configuration of Resources
- PaaS Compute Options
- Data Protection
- Monitoring Resources

3. LEARNING OUTCOMES

After completion of this course the student should be able to:

- Work with Azure AD, managing and creating resources.
- Using Network security groups and firewall to monitor traffic in and out of azure.
- Control access to resources using RBAC.
- Set up networks within azure.
- Set up inter-site communication between azure and on-premises clients.
- Deploy and manage virtual machines in the cloud.
- Deploy and manage cloud storage.
- Make use of scripting to automate deployment of cloud-based resources.
- Use various tools in azure to monitor performance of resources.
- Use azure tools to provide data protection on VMs

4. GRADUATE ATTRIBUTES (GA)

ECSA has defined several graduate attributes that a student must achieve in order to qualify for professional registration. This module contributes to developing the following of the ECSA defined Graduate Attributes which will be assessed during this module. **Note that failure to satisfy these GAs in this module will result in you failing the module.**

Graduate Attribute 7: Sustainability and impact of engineering activity Demonstrate critical awareness of the sustainability and impact of engineering activity on the social, industrial and physical environment.

Range Statement: The combination of social, workplace (industrial) and physical environmental factors must be appropriate to the sub-discipline or other designation of the qualification. Comprehension of the role of engineering in society and identified issues in engineering practice in the sub-discipline: health, safety and environmental protection; risk assessment and management and the impacts of engineering activity: economic, social, cultural, environmental and sustainability.

Graduate Attribute 10: Engineering professionalism Demonstrate critical awareness of the need to act professionally and ethically and to exercise judgment and take responsibility within own limits of competence.

Range Statement: Evidence includes case studies typical of engineering practice situations in which the graduate is likely to participate. Ethics and the professional responsibility of a technician and the contextual knowledge specified in the range statement of Graduate Attribute 7 is generally applicable here.

5. PRESENTATION FORMAT

The course is offered 90% in contact classes at the campus, with an additional online class via video lectures or live class using blackboard ultra.

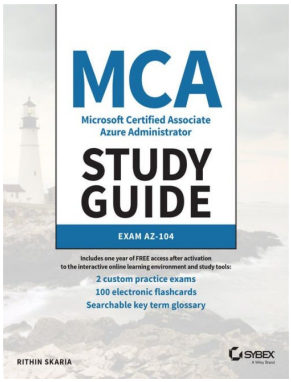
6. STUDY MATERIAL

Prescribed Book

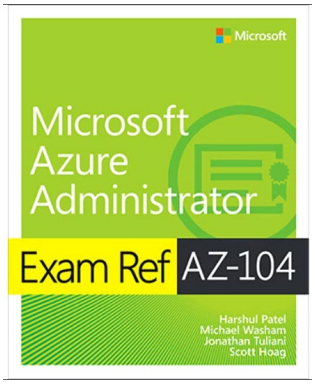
This module is based on the AZ-104 Certification exam, as such, any latest textbook that covers the curriculum is acceptable. You can also use the Microsoft learn website as a study source.

Exam AZ-104: Microsoft Azure Administrator - Certifications | Microsoft Learn

If you prefer hard copy, the following textbooks can be used:
Prescribed book



Additional book



7. Role of the lecturer in this module

The Lecturer or Instructor plays three key roles during the course of this module:

- To present the information so as to assist with the understanding of the material.
- To pace the rate of learning progress through the semester.
- To assess and record, if the required, level of competence that has been achieved.

8. Role of the student in a continuous assessment module.

The student or learner has the following responsibilities during the course of the study:

- To attend class
- Consult the relevant course materials to broaden understanding of the learning material.
- To complete the prescribed practical assignments when due.
- To demonstrate practical and theoretical knowledge of the material during assessment

9. Assessments

9.1 Type of Assessments: Written and Practical

All assessments are written physically on campus. There are three theory and 2 practical assessments. An optional assessment will be granted at the end of the semester as a makeup test.

	Theory	Practical	Assignment	Project
Content	Three theory tests	One practical assessment.	To be provided during the semester.	To be provided during the semester.
Marks contribution	40%	30%	5%	25%
GA contribution			GA 7	GA10

Assessments	Chapters	Dates	Venue
Theory assessment 1	1-3		GW006
Theory assessment 2	4 – 7		GW006
Theory assessment 3	8 -11		GW006
Optional assessment	1 - 11		GW006
Practical assessment			T212/T219
Assignment			
Project			

9.2 Theory

Most of the theory content comes from prescribed book, but there might be some additional material from projects or assignment that may be included in the tests.

9.3 Practical

Practical assessments are all based on lab work. There will be one practical assessment at the end of the semester. The pass mark for the assessment is 75%.

9.4 Assignment

One assignment will be given to you during the semester. The rubric in section 11 describes what you will be evaluated on. GA7 will be evaluated in this assignment.

9.5 Project

The project for the semester will be a combination of three modules, Engineering programming 3, Software engineering 3, and Operating systems 3. The project will comprise of a section from each of these modules. You are going to present your project once to all the three lecturers, and marks will be allocated by each according to their module.

The rubric underlines which area of each module you will be evaluated on.

NB. Note that part of passing the project includes satisfying the graduate attributes as described in the rubrics in section 11. Failing to satisfy the GAs will result in failing the module despite passing the theory.

9.6 Passing the module

A 50% average will be required from the practical assessment as well as satisfying the GAs for you to pass the module. You can still fail the module if you do well with your theory but fail to pass the practical evaluation and satisfy the GAs.

10. Syllabus content

Wk1	Learning units	Lectures	Labs	Description
Chpt 1: Identity - Azure Active Directory	Session 1	Azure Active Directory", "User and Groups	1	Manage Microsoft Entra ID Identities
	Session 2	"Azure AD Roles", "Azure AD Join"		
	Session 3	"Self-service Password Reset", "Managing Multiple Directories"		

Wk2	Learning units	Lectures	Labs	Description
Chpt 2: Compliance and Cloud Governance	**Session 1**	"Azure Regions", "Azure Accounts and Subscriptions", "Azure Cost Management"	2a	Manage Subscriptions and RBAC
	Session 2	"Resource Groups", "Management groups", "Azure Policy"	2b	Manage Governance via Azure Policy

	Session 3	"Role-based access control", "Resource Locks", "Resource Tags",		

Wk3	**Learning units**	**Lectures**	**Labs**	**Description**
Chpt 3: Virtual Networking	Session 1	"VNet Concepts", "IP Addressing", "Network Routes", "Service Endpoints", "Private Endpoints"	3	Implement Virtual Networking
	Session 2	"Azure DNS", "Network Security Groups", "Azure Firewall",		
	Session 3			

Wk4	**Learning units**	**Lectures**	**Labs**	**Description**
Chpt 4: Intersite Connectivity	Session 1	"Azure-to-Azure connectivity"	5	Implement Intersite Connectivity
	Session 2	"Azure to on-premises connectivity",		
	Session 3	"Intersite Connectivity Architecture", "Virtual WAN"		

Wk5	Learning units	Lectures	Labs	Description
Chpt 5: Network Traffic Management	Session 1	"Availability options", "Azure Load Balancer"	6	Implement Traffic Management
	Session 2	"Azure Application Gateway"		
	Session 3	"Azure Front Door", "Azure Traffic Manager", "Comparing the load balancing solutions"		

Wk6	Learning units	Lectures	Labs	Description
Chpt 6: Azure Storage	Session 1	"Azure Storage Account", "Azure Storage Services", "Storage Replication"	7	Manage Azure storage
	Session 2	"Storage account endpoint" and "Azure Blob Storage"		

	Session 3	"Storage security", "Azure Files and File Sync", Managing Storage."		

Wk7	Learning units	Lectures	Labs	Description
Chpt 7: Azure Virtual Machines	Session 1	"Virtual Machine Planning"	7	Manage Virtual Machines
	Session 2	"Connecting to Virtual Machines"		
	Session 3	"Scaling Concepts", "Virtual Machine Scale Set"		

Wk8	Learning units	Lectures	Labs	Description
Chpt 8: Automation, Deployment, and Configuration of Resources	Session 1	"ARM templates"	8a 8b 8c	Manage Azure resources by Using the Azure Portal Manage Azure resources by Using Azure PowerShell Manage Azure resources by Using Azure CLI
	Session 2	Configuring Virtual Hard Disk", "Virtual Machine Extensions"	8d	Manage Azure resources by Using ARM Templates
	Session 3			

Wk9	Learning units	Lectures	Labs	Description
Chpt 9: PaaS Compute Options	Session 1	"Azure App Service Plans", "Azure App Services"	9a	Implement Web Apps
	Session 2	"Azure App Services" (continued), "Container Instances"	9b	Implement Azure Container Instances
	Session 3	"Azure Kubernetes Services"	9c	Implement Azure Container Apps

Wk10	Learning units	Lectures	Labs	Description
Chpt 10: Data Protection	Session 1	"Files and Folder Backup",		
	Session 2	"Virtual Machine Data Protection"	10	Backup virtual machines
	Session 3			

Wk11	Learning units	Lectures	Labs	Description
Chpt 11: Monitoring Resources	Session 1	"Azure Monitor", "Azure Alerts"	11	Implement Monitoring
	Session 2	"Log Analytics", "Network Watcher"		
	Session 3			

11. Graduate Attributes Assessment Rubric