Faculty: Faculty of Computing & Informatics
Course Code: BUC3219
Credit Units: 4
Contact Hours: 60

1. Course Description

This course provides students with a comprehensive overview of the tools and techniques needed to successfully administer Web servers in a global business environment. Students will develop proficiency in the installation, configuration, and administration of common hardware and software platforms.

The course adopts a **vendor-neutral perspective**, covering both **Microsoft Windows Server (IIS)** and **Linux (Apache/Nginx)** environments. Emphasis is placed on automation, security hardening, performance monitoring, and the integration of distinct server types (DNS, Database, Web, Proxy) into a unified corporate infrastructure.

2. Learning Outcomes

By the end of this course, students will be able to:

1. **Analyze** the role of web servers within the broader ecosystem of server types (DNS, Mail, Database, Application).
2. **Install and Configure** web server operating systems (Windows Server & Linux) and software (IIS, Apache, Nginx).
3. **Manage** user authentication, file system permissions, and network resources.
4. **Implement** rigorous security measures, including firewalls, SSL/TLS encryption, and intrusion detection.
5. **Deploy** internet-based applications (DNS, FTP, Database connectivity) and troubleshoot server performance.
6. **Demonstrate** teamwork by integrating distinct server types into a unified, communicating network architecture.

3. Detailed Course Content (Theory & Lecture)

Week	Topic	Lesson Details
1	**The Web Server Ecosystem**	Review of LAN/WAN, ISPs, and Backbone; OSI Model (7 Layers) vs. TCP/IP; Protocols (HTTP/S, FTP, SMTP, DNS); Bandwidth vs. Throughput.
2	**Server Types & Roles**	Differentiating Server Roles (Web, App, DB, DNS, Mail); Hosting Models (Shared, Dedicated, Co-location, VPS).
3	**The Linux Web Stack**	Introduction to Apache & Nginx; Configuration hierarchy (httpd.conf, nginx.conf); Understanding Document Roots.
4	**The Microsoft Web Stack**	Role of Internet Information Services (IIS); Inetpub structure; IIS Manager GUI Architecture.
5	**Virtual Hosting & Bindings**	Name-based vs. IP-based Virtual Hosts; Host Headers; IIS Application Pools and Site Bindings.
6	**Authentication & Permissions**	**Linux:** User/Group management (chown/chmod), .htaccess overrides. **Windows:** Local Users vs. AD Users, NTFS Permissions.
7	**Network Security**	Identifying Threats (DoS, SQL Injection, XSS); Principles of Firewalls (Stateless vs

		Stateful); Attack Surface Reduction.
8	**Encryption (SSL/TLS)**	Symmetric vs. Asymmetric encryption; CA Chain of Trust; Generating CSRs (Certificate Signing Requests).
9	**Performance & Monitoring**	Analyzing Server Logs (Access/Error vs Event Viewer); Compression strategies (Gzip/Brotli); Caching headers.
10	**Application Deployment**	DNS Fundamentals (A-Records, CNAME, MX); FTP Protocols and Publishing.
11	**Dynamic Content & Databases**	Connecting Web Servers to Databases; Comparison of Stacks: LAMP (Linux) vs. WIMP (Windows).
12	**Project Integration**	Classroom workshop on connecting disparate systems; exchanging API keys/IPs between student groups.
13	**Final Presentation**	"Go Live" demonstration of the Connected Enterprise Project.

4. Practical Lab Schedule

Week	**Lab Topic**	**Objectives**	**Key Activities / Tools**
1	**Lab Environment Setup**	Prepare the virtualization environment.	Install VirtualBox/VMware; Download Windows Server &

			Ubuntu ISOs.
2	**OS Installation**	Install and prep server OS.	Install Windows Server 2022 & Ubuntu Server 24.04; Assign Static IPs.
3	**Linux Deployment**	Deploy a site via CLI.	Install Apache/Nginx (apt install); Edit index.html; Test curl localhost.
4	**IIS Deployment**	Deploy a site via GUI.	Install IIS Role; Configure "Default Website"; Edit Default Documents.
5	**Multi-Site Hosting**	Host multiple domains on one IP.	Configure Virtual Hosts (Linux) and Site Bindings (IIS) for site1.local and site2.local.
6	**Access Control**	Secure directories.	Create .htpasswd (Linux); Enable Windows Authentication (IIS); Set NTFS Deny permissions.

7	**Firewall Configuration**	Harden network access.	Configure UFW/iptables; Configure Windows Defender Firewall to allow only ports 80/443.
8	**Troubleshooting**	Diagnostics.	Fix a broken config (simulated); Use ping, netstat, nslookup.
9	**HTTPS Implementation**	Enable Encryption.	Use **Certbot (Let's Encrypt)** for Linux; Generate Self-Signed Certs for IIS.
10	**Log Analysis**	Monitor Traffic.	Install **GoAccess** or Log Parser; Analyze 404/500 errors in log files.
11	**DNS & FTP Setup**	Service Extension.	Configure a custom DNS Zone (Bind9/Windows DNS); Create an FTP User for file uploads.
12	**App Deployment**	Dynamic Content.	Install PHP & MySQL; Connect a simple PHP script to

			the database.
13	**System Integration**	Capstone Connection.	Connect Group A (DNS) → Group B (DB) → Group C (Web). Debug connectivity.
14	**Final Assessment**	Practical Exam.	Perform assigned tasks under timed conditions (e.g., "Deploy a secure site in 30 mins").

5. Capstone Project: The "Connected Enterprise"

Objective:

Students will be divided into specialized "Infrastructure Teams" (DNS, Database, Web, Proxy). By the end of the semester, these teams must integrate their isolated servers to create a fully functional, communicating web application stack.

6. Assessment Strategy

Component	**Weight**	**Description**
Coursework	30%	Includes Lab Exercises and Term Exams .
Final Project	60%	The "Connected Enterprise" Capstone.

Final Examination	40%	Comprehensive Written & Practical Exam.

7. Recommended Resources

- **Textbook:** *Web Server Administration* by Steve Silva (Course Technology).
- **Reference:** *UNIX and Linux System Administration Handbook* (Nemeth et al.).
- **Software:** Windows Server 2022 (Eval), Ubuntu Server 24.04 LTS, Apache, Nginx, MySQL.
- **Tools:** VirtualBox/VMware, Wireshark, Putty, Postman.