Title (Units): **COMP3067 Principles and Practices of Computer Networks and Security (3,3,2)**

Course Aims: This course aims to equip students with the knowledge of computer networks and network security. Practical knowledge and skills like server-side programming, network configuration, network monitoring, security management will also be covered.

Prerequisite: Nil; Programming background is preferred

Course Intended Learning Outcomes (CILOs):
Upon successful completion of this course, students should be able to:

No.	Course Intended Learning Outcomes (CILOs)
	Knowledge
1	Explain the functions of each layer of the computer networks.
2	Describe the essentials of security and different security applications.
3	Demonstrate the ability of hands-on practice of computer networks and network security.
4	Construct and manage a server-side web application.

Calendar Description: This course covers computer networks and network security. Students will be given lectures on the principles of computer networks (such as Web, HTTP, TCP/IP, Ethernet, VLAN, VoIP, cloud computing) and network security (such as encryption, authentication, data integrity, TLS, HTTPS, VPN, firewall, IDS). Students will also learn server-side programming and the practical knowledge and skills of computer networks and security such as network configuration, cloud management, security management, and network monitoring. Programming assignments allow students to practice some basic server-side programming skills. A programming group project is designed to let students apply their server-side programming skills and knowledge to a real-world environment setting.

Teaching and Learning Activities (TLAs):

CILOs	Type of TLA
1,2,4	Lectures: Students will attend lectures to learn the principles of computer networks, security, and server-side programming.
3,4	Laboratories: Students will attend laboratories to learn the practical knowledge and skills of computer networking, network security, and server-side programming.

Assessment:

No.	Assessment Methods	Weighting	CILOs to be addressed	Description of Assessment Tasks
1	Quiz	15%	1,2	Quizzes are given to students to measure how well they have learned the principles of computer networks and security.
2	Laboratories Report	20%	3,4	A reflection report is required to submit after each laboratory section. This will measure how well students acquired the practical knowledge and skills of computer networks, network security, and server-side programming.
3	Programming assignment	10%	4	An individual programming assignment is designed to measure how well students can understand and apply the basic server-side programming skills to a small scope.

4	Programming Project	15%	4	A programming group project is designed to measure how well students can comprehend the skills and knowledge they have learned to construct a server-side web application in a real-world environment setting.
5	Exam	40%	1-4	Final exam questions are designed to measure how well students have achieved their intended learning outcomes.

Assessment Rubrics:

Excellent (A)	• Excellent in explaining the concepts of computer networks and network security. • Fully capable of applying hands-on skills to tasks related to computer networks and ne • Fully capable of constructing and managing server-side web applications in a rea environment setting.
Good (B)	• Good at explaining the concepts of computer networks and network security. • Capable of applying hands-on skills to tasks related to computer networks and networ • Capable of constructing and managing server-side web applications in a rea environment setting.
Satisfactory (C)	• Being able to explain most of the concepts of computer networks and network securit • Capable of applying hands-on skills to most tasks related to computer networks and ne • Able to perform most tasks about constructing and managing server-side web applica a real-world environment setting.
Marginal Pass (D)	• Being able to explain some of the concepts of computer networks and network securi • Capable of applying hands-on skills to some tasks related to computer networks and ne • Able to perform some tasks about constructing and managing server-side web applica a real-world environment setting.
Fail (F)	• Unable to explain the concepts of computer networks and network security. • Incapable of applying hands-on skills to tasks related to computer networks and netw • Unable to construct or manage server-side web applications in a real-world envi setting.

Course Content and CILOs Mapping:

Content		**CILO No.**
I	Basic Concepts of Data Communication	1
II	Principles of Computer Networks	1
III	Principles of Security	2
IV	Practices of Computer Networks and Network Security	3
V	Server-side Programming	4

References:

- Kurose, James F., and Ross Keith W. Computer Networking: A Top-Down Approach. Sixth Ed, Pearson, 2013.
- Tanenbaum, Andrew S., and Wetherall, David J. Computer Networks. Fifth Ed, Pearson, 2014.
- Groom, Frank M., Kevin M. Jones, and Jones, Stephan. Network and Data Security for Non-Engineers, First Ed, Auerbach Publication, 2017.
- Gackenheimer, Cory. Node.js Recipes A Problem-Solution Approach. First Ed, Apress, 2013.

Course Content:

Topic

I. Basic Concepts of Data Communication
   A. Communication model
   B. Network categories
   C. Protocol architecture

II. Principles of Computer Networks
   A. Application layer – Web, HTTP, DNS,
   B. Transport and Network layer – TCP/UDP, IP, netmask
   C. Physical and Data Link Layer – Ethernet, VLAN, cabling
   D. Network Application (e.g VoIP, Streaming)
   E. Cloud Computing

III. Principles of Security
   A. Essentials of Security – encryption, authentication, data integrity
   B. Secure Connection – TLS, HTTPS, VPN
   C. Network Security – Firewall, Intrusion Detection System (IDS)

IV. Practices of Computer Networks and Network Security
   A. Network Configuration
   B. Cloud Management
   C. Network Monitoring (e.g. Wireshark)
   D. Security Management (e.g. certificate, VPN)

V. Server-side Programming
   A. Server-side Programming Language (e.g. Node.js)
   B. Integrate with a Database
   C. Cloud Deployment