Title (Units): **COMP3015 Data Communications and Networking (3,3,1)**

Course Aims: To learn the principles of data communications, computer networks and network programming.

Prerequisite: COMP2045 Programming and Problem Solving

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

No.	Course Intended Learning Outcomes (CILOs)
	Knowledge
1	Describe network components and architectures
2	Explain the fundamental principles of computer communication at the physical layer, data link layer and network layer.
3	Describe some standardized and popular networks, including Ethernet and WiFi
4	Explain the principles of network programming
	Professional Skill
5	Design and implement client-server applications using socket programming

Calendar Description: Students will learn the principles of data communications, computer networks and network programming.

Teaching and Learning Activities (TLAs):

CILOs	Type of TLA
1 - 4	Students will attend lectures to learn the principles of data communications, computer networks and network programming. They will be given tutorial questions and participate in class discussion for in-depth learning.
4,5	Students will attend laboratory sessions to gain practical experience in network programming.
1 - 4	Students will work on written assignments to consolidate and apply what they have learnt.
4,5	Students will work on programming assignments to design and implement client-server applications.

Assessment:

No.	Assessment Methods	Weighting	CILOs to be addressed	Description of Assessment Tasks
1	Continuous Assessment	40%	1 - 5	Continuous assessments are designed to measure how well students have learned the basic concepts of data communications and networking. A course project is designed to measure how well students have learned the network programming techniques.
2	Examination	60%	1 - 5	Final examination questions are designed to see how far students have achieved their intended learning outcomes.

Assessment Rubrics:

	Excellent (A)	Good (B)	Satisfactory (C)	Marginal Pass (D)	Fail (F)
Network components and architectures	Demonstrates thorough knowledge and understanding of key concepts of network	Demonstrates sufficient knowledge and understanding of key concepts of network	Demonstrates moderate knowledge and understanding of key concepts of network	Demonstrates some knowledge and understanding of key concepts of network	Demonstrates limited knowledge and understanding of key concepts of network

	components and architectures	components and architectures	components and architectures	components and architectures	components and architectures
Principles of computer communication	Demonstrates thorough knowledge and understanding of the fundamental principles of computer communications at the physical layer, data link layer and network layer	Demonstrates sufficient knowledge and understanding of the fundamental principles of computer communications at the physical layer, data link layer and network layer	Demonstrates moderate knowledge and understanding of the fundamental principles of computer communications at the physical layer, data link layer and network layer	Demonstrates some knowledge and understanding of the fundamental principles of computer communications at the physical layer, data link layer and network layer	Demonstrates limited knowledge and understanding of the fundamental principles of computer communications at the physical layer, data link layer and network layer
Standardized networks	Demonstrates thorough knowledge and understanding of key concepts and principles of standardized networks such as Ethernet and WiFi	Demonstrates sufficient knowledge and understanding of key concepts and principles of standardized networks such as Ethernet and WiFi	Demonstrates moderate knowledge and understanding of key concepts and principles of standardized networks such as Ethernet and WiFi	Demonstrates some knowledge and understanding of key concepts and principles of standardized networks such as Ethernet and WiFi	Demonstrates limited knowledge and understanding of key concepts and principles of standardized networks such as Ethernet and WiFi
Network programming	Has a high degree of effectiveness and correctness in the design and implementation of client-server applications using socket programming	Has a considerable degree of effectiveness and correctness in the design and implementation of client-server applications using socket programming	Has a moderate degree of effectiveness and correctness in the design and implementation of client-server applications using socket programming	Has some degree of effectiveness and correctness in the design and implementation of client-server applications using socket programming	Has a limited degree of effectiveness and correctness in the design and implementation of client-server applications using socket programming

Course Content and CILOs Mapping:

Content		**CILO No.**
I	Basic Concepts	1
II	Principles of Computer Communications	2
III	Standardized Networks	3
IV	Network Programming	4,5

References:

- B. Forouzan, Data Communications and Networking, 5th Edition, McGraw Hill, 2012
- A. S. Tanenbaum, Computer Networks, 5th Edition, Prentice Hall, 2010
- W. Stallings, Data and Computer Communications, 10th Edition, Prentice Hall, 2013
- E. R. Harold, Java Network Programming, 4th Edition, O′ Reilly, 2013

Course Content:

Topic

I. Basic Concepts
   A. Communications model
   B. Network categories

C. Protocol architecture

II. Principles of Computer Communications
   A. Physical layer: transmission media, signal analysis, bandwidth and data rate, digital transmission, analog transmission, multiplexing
   B. Data link layer: framing, error control, flow control, multiple access protocols
   C. Network layer: virtual circuit and datagram networks, routing

III. Standardized Networks
   A. Ethernet
   B. Wireless LANs

IV. Network Programming
   A. Socket programming: background and principles
   B. Design of clients
   C. Design of servers