University of Asia Pacific (UAP)
Department of Computer Science and Engineering (CSE)

Course Outline

Program:	Computer Science and Engineering (CSE)
Course Title:	Data Communication and Computer Networks Lab
Course Code:	CSE 312
Semester:	Spring 2025
Level:	6th Semester
Credit Hour:	1.5
Name & Designation of Teacher:	Dr. Muhammad Towfiqur Rahman, Assistant Professor Molla Rashid Hussain, Assistant Professor
Office/Room:	7th Floor
e-mail:	towfiq@uap-bd.edu , mrh.cse@uap-bd.edu
Mobile:	+8801886922110
Rationale:	Required course in the CSE program.

Part A – Course Objectives

Course Synopsis: This course will provide students with a hands-on learning experience to complement theoretical knowledge gained in the classroom. The course is structured to give equal emphasis to both data communication and computer networking aspects, ensuring a balanced understanding of core concepts and practical skills.

Course Objective: Throughout the course, students engage in a series of lab sessions designed to reinforce theoretical concepts and develop proficiency in network configuration, troubleshooting, and analysis. These sessions cover a range of topics, including network protocols, LAN/WAN technologies, routing and switching, network security, and wireless networking such as optical fiber communications.

Students work individually and in teams to complete lab assignments and projects, applying their knowledge to real-world scenarios. They configure network devices, implement security measures, analyze network traffic, and design network solutions to meet specific requirements. At the end of the course, students are exposed to various techniques like amplitude modulation/ demodulation, frequency modulation/ demodulation, phase shift keying etc. being used in communication engineering.

Course Outcomes (CO) and their mapping with Program outcomes (PO) and Teaching-Learning Assessment methods:

CLO No.	CLO Statements: Upon successful completion of the course, students should be able to:	Corresponding PLOs (Appendix-1)	Bloom's Taxonomy Level (Appendix-2)	Delivery methods and activities	Assessment Tools	Ks	Ps	As
CLO1	**Understand** the concept of Computer Networking and data communication modelling with WDM system by networking simulator.	a	Analyze & Design	Lecture, Hands on experience with network simulation	Lab performance	**K1 K2 K3 K4 K5 K6 K7**	**P1, P2, P7**	**A1, A2, A4**
CLO2	**Identify**, formulate, research literature and analysis engineering problems reaching sustainable model.	b	Investigate	Lecture, Hands on experience with network simulation	Presentation and documentation			
CLO3	D**esign** a project based on data communication ideas to solve real-life problems.	c	Design	Lecture on Project	Lab Performance			
CLO4	**Create** the specific network architecture with the modern simulation tools in a team.	c	Create	Hands on experience	Project and documentation Viva			
CLO5	**Evaluate** the reports on networking issues and data transmission projects with proper analysis.	j	Evaluate	Project document learning	Project Presentation and Viva			

Weighting CLOs with Assessment methods:

Assessment type	% weight	CLO1	CLO2	CLO3	CLO4	CLO5
Lab Task	30%		10		20	
Lab Exam	10%		5		5	
Lab Project design	20%			10	10	
Project documentation	30%			10	10	10
Final Viva / Presentation	10%	5				5
Total	**100%**					

Grading Policy: As per the approved grading policy of UAP (Appendix-3)

Part B –Course Contents

Course Content Outline and Mapping with Cos

Week	Activity	Course Outcome	Delivery methods and activities	Reading Materials
1	Introducing LAN cables, connectors, cable tester, crimping tools, and Learn IPv4 addressing and networking model using CISCO Packet Tracer.	CLO1	Lecture, Problem Solving	https://www.youtube.com/watch?v=Xj2AhCF_asg
3	Network Design using Static Routing and hands on experience for network cabling using CAT-6 and RJ45	CLO2	Model design	VLAN>> https://www.youtube.com/watch?v=jxskTo6W-jU
2	Configure of different Network Topologies, LAN, WAN configuration.	CLO1	Problem Solving	https://www.youtube.com/watch?v=rZw_b0wpQ00
4	Client–Server Networking and DHCP/DNS/Mail/FTP Configuration	CLO2	Lecture, Problem Solving	https://www.youtube.com/watch?v=gFRux1w3QLk
5	Design of Basic RoF (Radio-over-Fiber) communication model for 5G using Optisystem software. Plotting, characteristics, eye pattern.	CLO3	Design and Discussion	https://www.youtube.com/watch?v=rwFehc-MAGA&list=PLI0y8_sKQPD9DlBXhPO53hJtkDYCq6073
6	WDM-based communication model for 8/16/32 channels	CLO3	Design and Problem Solving	https://www.youtube.com/watch?v=DZBKuVn4C_M (2 CH) https://www.youtube.com/watch?v=06z3zI3nGV0 (32 CH)
7	Simulation of FSO Link (Lifi /VLC) Performance under Different atmosphere.	CLO4	Design and Problem Solving	https://www.youtube.com/watch?v=XTOGFMxVi0w&t=98s
8	Optical amplifier design covering in-line,	CLO4		https://www.youtube.com/watch?v=pOMzdJNYWj4

	preamplifier, power/booster amplifier, and SOA in-line amplifiers.			
9	Design and Performance Evaluation of DWDM-PON using RZ and NRZ Modulation	CLO3		https://www.youtube.com/watch?v=felv_fm8280
10	**Project:** Design a Lightwave system projects 1) High speed transmission in standard mode fibers (SMF). 2) Broadband optical system based on PON, FSO) link design.	CLO5	Final project idea distribution and	
11	Subnetting (FLSM and VLSM), OSPF Routing Protocol. Project update	CLO1		https://www.youtube.com/watch?v=tuFCMa_udik
12	VLAN and RIP v1 and RIP v2 Based Multi-Campus Network Design	CLO2	Design and Problem Solving	RIP >> https://www.youtube.com/watch?v=i83qrFq3 VLAN >> https://www.youtube.com/watch?v=ro6MhJfVRSE
13	OSPF and EIGRP routing protocol design.	CLO3	Design and Discussion	https://www.youtube.com/watch?v=c4iz_GPPYvo
14	Final Project Submission, Viva-Voce,	CLO5	Final project and report, Presentation	--

Part C – Assessment and Evaluation:

Assessment type		**Understanding**	Investigate	Design	Create	Evaluate
Lab Task			10		20	
Lab Exam			5		5	
Lab Project design				10	10	
Project documentation				10	10	10
Final Viva / Presentation		5				5
Total	**100**	5	15	20	45	15

Special Instructions:

- **Project submission rules**- If you miss the due date then the full marks will be deducted respectively to the number of days you have missed. (It is maintained very strictly unless any very serious issue arises)
- **Plagiarism** of the assignments/documentation will be checked strictly
- **Attendance-** Minimum Required Attendance 80% to pass the course and to get a higher grade you need to attend all the classes. (**For A+ 100% attendance is a must**)
- **Presentation Rubrics-** Fluency, Response, Readiness, Pronunciation, and Team Capacity

Part D – Learning Resources

Required Reference(s): (1) Computer Networking A Top-Down Approach (CNA) - *James F. Kurose*

Recommended Reference(s): (1) Computer Networks - *ANDREW S. TANENBAUM*

Simulation Tool(s): (1) Cisco Packet Tracer
(2) OMNet++
(3) Optisystem

Teaching-Learning Strategies:

Active Learning: Encourage students to actively participate in the course material through rigorous problem-solving, fruitful discussions, and engaging group activities.

Assessment Techniques of each topic of the course: Lectures, Lab Task, Project, Presentation

Prepared by (Course Teacher)	**Checked by** (Chairman, PSAC committee)	**Approved by** (Head of the Department)
Dr. Md Towfiqur Raman		

Appendix-1:
Washington Accord Program Outcomes (PO) for engineering programs:

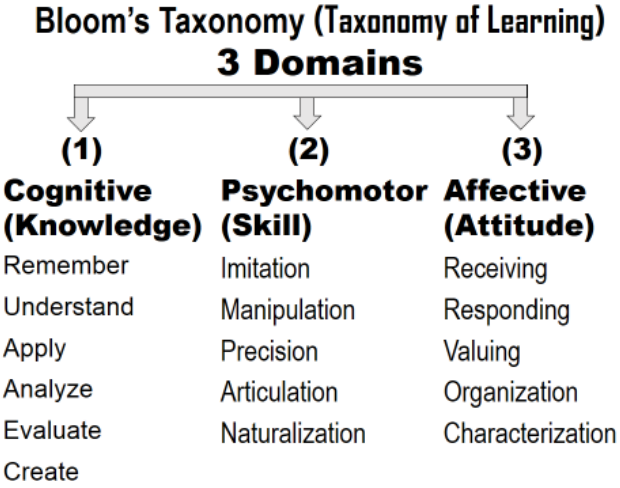
No.	PO
a	Apply knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization as specified in K1 to K4 respectively to the solution of complex engineering problems.
b	Identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences. (K1 to K4)
c	Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations. (K5)
d	Conduct investigations of complex problems using research-based knowledge (K8) and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.
e	Create, select and apply appropriate techniques, resources and modern engineering and IT tools, including prediction and modeling, to complex engineering activities with an understanding of their limitations.

f	Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice and solutions to complex engineering problems. (K7)
g	Understand and evaluate the sustainability and impact of professional engineering work in the solution of complex engineering problems in societal and environmental contexts. (K7)
h	Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice. (K7)
i	Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.
j	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
k	Demonstrate knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
l	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Knowledge Profiles:

K1	A systematic, theory-based understanding of the natural sciences applicable to the discipline
K2	Conceptually based mathematics, numerical analysis, statistics and formal aspects of computer and information science to support analysis and modeling applicable to the discipline
K3	A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline
K4	Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline
K5	Knowledge that supports engineering design in a practice area
K6	Knowledge of engineering practice (technology) in the practice areas in the engineering discipline
K7	Comprehension of the role of engineering in society and of the identified issues in engineering practice in the discipline: ethics and the engineer's professional responsibility to public safety; the impacts of engineering activity in economic, social, cultural, environmental and sustainability terms
K8	Engagement with selected knowledge in the research literature of the discipline

Appendix-2



Evaluation Policy

Grades will be calculated as per the university grading structure and individual student will be evaluated based on the following criteria with respective weights.

1. Lab Tasks and Lab Exam 40%
2. Project 60%

Appendix-3

UAP Grading Policy:

Numeric Grade	Letter Grade	Grade Point
80% and above	A+	4.00
75% to less than 80%	A	3.75
70% to less than 75%	A-	3.50
65% to less than 70%	B+	3.25
60% to less than 65%	B	3.00
55% to less than 60%	B-	2.75
50% to less than 55%	C+	2.50
45% to less than 50%	C	2.25
40% to less than 45%	D	2.00
Less than 40%	F	0.00