NCEAC.FORM.001-D

COURSE DESCRIPTION FORM

INSTITUTION   National University of Computer and Emerging Sciences-FAST

PROGRAM (S) TO BE   Computer Science

EVALUATED

A. Course Description

(Fill out the following table for each course in your computer science curriculum. A filled out form should not be more than 2-3 pages.)

Course Code	CS 3001
Course Title	Computer Networks
Credit Hours	03
Prerequisites by Course(s) and Topics	CS2001-Data Structures
Assessment Instruments with Weights (homework, quizzes, midterms, final, programming assignments, lab work, etc.)	**Mid1: 15%** **Mid2: 15%** **Final: 50%** **Semester Work (assignments/projects): 20 %** **Assignments: 10% → 3 Assignments** **Quizzes: 10% → 3 Quiz**
Course Coordinator	Dr. Gufran Ahmed
URL (if any)	
Current Catalog Description	The learning and skill based objectives of this course resolve around the following questions: • How does the global network infrastructure work and what are the design principles on which it is based? • In what ways are these design principles compromised in practice? • How should Internet applications be written, so they can obtain the best possible performance both for themselves and for others using the infrastructure? • How do we ensure that it will work well in the future in the face of rapidly growing scale and heterogeneity? The course will focus on the design & undergraduate level analysis of large-scale networked systems and tool (wireshark, packet tracer) based implementation and evaluation of small-scale networked systems in the Lab.

Textbook (or Laboratory Manual for Laboratory Courses)	J. F. Kurose and K. W. Ross --- **Computer Networking: A Top Down Approach, 8th Edition**
Reference Material	A. S. Tannenbaum and D. J. Wetherall --- **Computer Networks, 6th Edition**
Course Goals	

A. Course Learning Outcomes (CLOs)

No.	Course Learning Outcomes (CLO)	Domain	Taxonomy Level	PLO	Tools
01	Describe and evaluate the protocols, services and functions provided by each layer in the Internet protocol stack.	Cognitive	C2 (Describe)	1	Q, M, F
02	Apply network protocol and communication services for client/server and other application layouts.	Cognitive	C3 (Apply)	3,5	A, CP, M, F
03	Analyze the architectural principles of computer networking and compare different approaches to organizing networks.	Cognitive	C4 (Analyze)	2	Q, M, F

Tool: A = Assignment, Q = Quiz, M = Mid-term, CP=Course Project, F=Final (End-term)

B. Program Learning Outcomes

For each attribute below, indicate whether this attribute is covered in this course or not. Leave the cell blank if the enablement is little or non-existent.

PLO			
PLO 1	Computing Knowledge	Apply knowledge of mathematics, natural sciences, computing fundamentals, and a computing specialization to the solution of complex computing problems.	✔
PLO 2	Problem Analysis	Identify, formulate, research literature, and analyze complex computing problems, reaching substantiated conclusions using first principles of mathematics, natural sciences, and computing sciences.	✔
PLO 3	Design/Develop Solutions	Design solutions for complex computing problems and design systems, components, and processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.	✔
PLO 4	Investigation & Experimentation	Conduct investigation of complex computing problems using research based knowledge and research based methods	
PLO 5	Modern Tool	Create, select, and apply appropriate	✔

			techniques, resources and modern computing tools, including prediction and modelling for complex computing problems.	
		Usage		
PLO 6	Society Responsibility		Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal, and cultural issues relevant to context of complex computing problems.	
PLO 7	Environment and Sustainability		Understand and evaluate sustainability and impact of professional computing work in the solution of complex computing problems	
PLO 8	Ethics		Apply ethical principles and commit to professional ethics and responsibilities and norms of computing practice.	
PLO 9	Individual and Team Work		Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.	
PLO 10	Communication		Communicate effectively on complex computing activities with the computing community and with society at large.	
PLO 11	Project Mgmnt and Finance		Demonstrate knowledge and understanding of management principles and economic decision making and apply these to one's own work as a member or a team.	
PLO 12	Life Long Learning		Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological changes.	

C. Relation between CLOs and PLOs
(CLO: Course Learning Outcome, PLOs: Program Learning Outcomes)

		PLOs											
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CLOs	1	✔											
	2			✔		✔							
	3		✔										

Topics Covered in the Course, with Number of Lectures on Each Topic (assume 15-week instruction and one-hour lectures)

Week	Duration	Topics Covered	CLOs
1.	L1 = 1 hour L2 = 1 hour L3 = 1 hour	L1: 1.1 - Introduction, Course L2: 1.2-1.3 - Network Edge, Network Core (ISPs, internet Vs. intranet, Internet) L3: 1.4 - ISPs and Internet Backbones (Tiers of ISPs), Delay, Loss and Throughput in Packet-Switched Networks	1
2.	L1 = 1 hour L2 = 1 hour L3 = 1 hour	L1: 1.5 - Protocol Layers, Service Model L2: 1.6-1.7 Network Under Attacks, History L3: 2.1 Principles of network Applications	1
3.	L1 = 1 hour L2 = 1 hour L3 = 1 hour	L1: 2.2 - Web and HTTP L2: 2.3-2.4 Electronic Mail and DNS L3: 2.5 – P2P Distributions **Assignment no. 1 (5th Feb 2024)**	1,3
4.	L1 = 1 hour L2 = 1 hour L3 = 1 hour	L1: 2.6 Video Streaming and Content Distribution L2-L3: 3.1-3.2 – Transport Layer service, Multiplexing and De-multiplexing	1,2,3
5.	L1 = 1 hour L2-L3 = 2 hours	L1: 3.3 – Connectionless Transport UDP L2-L3: 3.4 – Principles of Reliable data transport **QUIZ-I (19th – 23rd Feb)**	1,2,3
6.	**1 Hour**	**Midterm # 1**	
7.	L1-L2 = 2 hours L3 = 1 hour	L1-L2: 3.5 Connection Oriented Transport: TCP L3: Exam Review	1,2
8.	L1-L2 = 2 hours L3 = 1 hour	L1-L2: 3.6 Principles of Congestion Control L3: 3.7 - TCP Congestion Control	1,2
9.	L1 = 1 hour L2 = 1 hour L3 = 1 hour	L1: 4.1 – Network Layer Overview L2: 4.2 – What's Inside a Router L3: 4.3 – Internet Protocol **Assignment no. 2 (18th March 2024)**	1,2
10.	L1 = 1 hour L2 = 1 hour L3 = 1 hour	L1-2: 4.3 – Internet Protocol Continued L3: 4.4 Generalized Forwarded and SDN and 4.5 – Middle Boxes **QUIZ-II (1th – 5th April)**	1,2
11.	**1 Hour**	**Midterm # 2**	
12.	L1 = 1 hour L2 = 1 hour L3 = 1 hour	L1: 4.4 Generalized Forwarded and SDN and 4.5 – Middle Boxes L2: 5.1-5.3 – Routing Algorithms and Intra-AS routing L3: Exam Review	1,2, 3
13.	L1-L3 = 3 hours	L1-2-3: 5.4. Routing Amount the ISP **Assignment no. 3 (29th April 2024)**	1,2,3
14.	L1-2 = 2 hours L3 = 1 hour	L1-2: 5.5 – SDN Control Plane L3: 5.6 – ICMP **QUIZ-III (13th – 17th May)**	1,3
15.	L1-3 = 3 hours	L1-3: 6.4 – Switched LANs	1,3
16.	3 hours	Course wrap-up and Project evaluations	1,2,3

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Laboratory Projects/Experiments Done in the Course	Project will focus on the application of network fundamentals and practices to develop efficient networking solutions and applications.			
Programming Assignments Done in the Course	Various. Semester Projects will target Network Application which uses cloud components to implement various domains. Socket Programming			
Class Time Spent on (in credit hours)	Theory	Problem Analysis	Solution Design	Social and Ethical Issues
	30%	30%	30%	10%
Oral and Written Communications				

Instructor Name: ___Dr. Aqsa Aslam__

Instructor Signature: _____

Date:_____22/1/2024_____