AMERICAN INTERNATIONAL UNIVERSITY-BANGLADESH (AIUB)

Faculty of Science and Technology (FST)
Department of Computer Science (CS)
Undergraduate Program

COURSE PLAN	SEMESTER: Fall 2025-2026
I. Course Code and Title COE 3204 Computer Networks **II. Credit & Contact Hours** 3 credit hours (3 hours of theory per week) **III. Nature** Core Course for CS, CSE, CSSE, SE, CIS, COE **IV. Prerequisite** COE 3103 Data Communication	**V. Vision:** Our vision is to be the preeminent Department of Computer Science through creating recognized professionals who will provide innovative solutions by leveraging contemporary research methods and development techniques of computing that is in line with the national and global context. **VI. Mission:** The mission of the Department of Computer Science of AIUB is to educate students in a student-centric dynamic learning environment; to provide advanced facilities for conducting innovative research and development to meet the challenges of the modern era of computing, and to motivate them towards a life-long learning process.

VII - Course Description

- Illustrate basic concepts of OSI model.
- Use FLSM and VLSM for subnetting a network.
- Apply the concept of DHCP for allocating IP addresses to different devices.
- Demonstrate how to use different datalink layer protocols for sharing a transmission medium among multiple devices.
- Change a LAN into multiple VLANs for ensuring better security and easy management.
- Apply various congestion and flow control mechanisms to limit the network congestion and data flow.
- Perform configuration of switch and routers for designing and implementing computer networks
- Use IPv6 address to configure a network.
- Determine the best routing path using different routing protocols such as RIP, EIGRP, OSPF etc.
- Apply NAT to allow many devices to be connected to the Internet with a limited number of public IP addresses.
- Use the concepts of error control techniques, HDL, and fragmentation for reliable communications.

VIII - Course outcomes (CO) Matrix:

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

COs*	CO Description	Level of Domain***			PO Assessed ****
		C	P	A	
CO1	**Determine** various subnetting techniques to design subnets and the parameters of the subnets for complex engineering problems through appropriate investigation	5			PO-d-1
CO2 **	**Develop** different network design by using modern engineering tools for modeling of different network topologies considering complex engineering problems		5		PO-e-3
CO3	**Apply** error control codes to detect and/or correct transmission errors with a trade-off between error detection capability and throughput.	3			PO-a-4
CO4	**Determine** and **demonstrate** various types of IP addressing techniques.	5			PO-b-3

CO5	**Evaluate** and **investigate** solution of complex engineering problem by combination of information to provide valid conclusions.	5			PO-d-3

C: Cognitive; P: Psychomotor; A: Affective Domain
* *CO assessment method and rubric of COs assessment is provided in later section*
** *COs will be mapped with the Program Outcomes (POs) for PO attainment*
*** *The numbers under the 'Level of Domain' columns represent the level of Bloom's Taxonomy each CO corresponds to.*
**** *The numbers under 'PO Assessed' column represent the POs each CO corresponds to.*

IX - Topics to be covered in the class and/or lab: *

Time Frame	CO Mapped	Topics	Teaching Activities	Assessment Strategy(s)
Week 1	CO1, CO4	OBE, Brief review of OSI, TCP/IP model, Networking basics Basics of IP addressing. LAB: IP addressing	Lecture, Question-answer, Lab Practice	Quiz, Lab Exam, Term Exam
Week 2	CO1, CO4	Application layer protocols: DNS, HTTP LAB: VLSM	Lecture, Question-answer, Lab Practice	Quiz, Lab Exam, Term Exam
Week 3	CO3, CO5	Data Link layer protocol-I: Channelization and Controlled multiple access technique LAB: Cabling and connection	Lecture, Question-answer, Lab Practice	Quiz, Lab Exam, Term Exam
Week 4	CO3, CO5	Data Link layer protocol-II: Random access Protocol: ALOHA, CSMA, CSMA/CD, CSMA/CA LAB: Basic network design	Lecture, Question-answer, Lab Practice	Quiz, Lab Exam, Term Exam
Week 5	CO1, CO2, CO5	Routing, static and dynamic routing, RIP V1 & V2 LAB: Basic network design with VLSM and RIP	Lecture, Question-answer, Lab Practice	Lab Exam, Term Exam
Week 6	CO1, CO2, CO5	Network layer protocol: DHCP, Network Layer protocol: ARP LAB: Lab Evaluation	Lecture, Question-answer	Quiz, Lab Exam, Term Exam
Midterm (Week 7)				
Week 8	CO2, CO3	Error Control mechanism: Cyclic redundancy check, Linear block code LAB: DHCP server, DNS server and Email server	Lecture, Question-answer, Lab Practice	Quiz, Lab Exam, Term Exam
Week 9	CO2, CO5	Switched network: Illustrate Virtual Local Area Network (VLAN), Inter-VLAN and Virtual Trunk Port (VTP) LAB: Implementation of VLAN and VTP	Lecture, Question-answer, Lab Practice	Quiz, Lab Exam, Term Exam
Week 10	CO2, CO5	Introduction to Logical addressing (IPv6): Explain IPv6 addresses, Special addressing of IPv6, address mapping. LAB: Implementation of Inter-VLAN	Lecture, Question-answer, Lab Practice	Quiz, Lab Exam, Term Exam

Week 11	CO2, CO5	Network Address Translation (NAT): Explain NAT and Port Address Translation (PAT) LAB: Implementation of NAT/PAT	Lecture, Question-answer, Lab Practice	Quiz, Lab Exam, Term Exam
Week 12	CO2, CO5	Transport layer protocol-I: TCP (TCP three-way handshake), Scenarios of error control mechanism), UDP LAB: Implementation of dynamic routing protocol: EIGRP	Lecture, Question-answer, Lab Practice	Quiz, Lab Exam, Term Exam
Week 13	CO2, CO5	Transport layer protocol-II: Congestion control algorithm (Reno), Sliding window technique. LAB: Implementation of dynamic routing protocol: OSPF HDLC, Fragmentation LAB: Lab Evaluation	Lecture, Question-answer, Lab Practice	Quiz, Lab Exam, Term Exam
Final term (Week 14)				
Makeup Assessment/Assignment Submission/Defense/Viva (Week 15)				

* *The faculty reserves the right to change, amend, add, or delete any of the contents.*

X - Mapping of PO to Courses and K, P, A

PO Indicator ID	PO Indicators Definition (As per the requirement of WKs)	Domain	K	P	A
PO-d-1	Investigate the design of experiments for complex engineering problems through appropriate research.	Cognitive Level 5 (Evaluating)	K8	P1 P3 P7	
PO-e-3	Create relevant resources for complex engineering problems using modern engineering tools	Psychomotor Level 5 (Naturalization)		P1 P3 P7	
PO-a-4	Apply information and concepts in specialized engineering sciences with the in-depth of analysis of a complex engineering problem.	Cognitive Level 3 (Applying)	K4	P1 P3 P7	
PO-b-3	Analyze solutions for complex engineering problem reaching substantiated conclusion.	Cognitive Level 5 (Evaluating)	K3	P1 P3 P7	
PO-d-3	Investigate solution of complex engineering problem by synthesis of information to provide valid conclusions.	Cognitive Level 5 (Evaluating)	K8	P1 P4 P5	

XI – K, P, A Definitions

Indicator	Title	Description
K3	Theory based engineering fundamentals	A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline

K4	Forefront specialist knowledge for practice	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
K8	Research Literature	Engagement with selected knowledge in the research literature of the discipline
P1	Depth of knowledge required	Cannot be resolved without in-depth engineering knowledge at the level of one or more of K3, K4, K5, K6 or K8 which allows a fundamentals-based, first principles analytical approach
P3	Depth of analysis required	Have no obvious solution and require abstract thinking, originality in analysis to formulate suitable models
P4	Familiarity of issues	Involve infrequently encountered issues
P5	Extent of applicable codes	Are outside problems encompassed by standards and codes of practice for professional engineering
P7	Interdependence	Are high level problems including many component parts or sub-problems

XII – Mapping of CO Assessment Method and Rubric

The mapping between Course Outcome(s) (COs) and The Selected Assessment method(s) and the mapping between Assessment method(s) and Evaluation Rubric(s) is shown below:

COs	Description	Mapped POs	Assessment Method	Assessment Rubric
CO1	*Determine* various subnetting techniques to design subnets and the parameters of the subnets for complex engineering problems through appropriate investigation	PO-d-1	Quiz, Lab Exam, Term Exam	Rubric for Midterm Exam
CO2	*Develop* different network design by using modern engineering tools for modeling of different network topologies considering complex engineering problems	PO-e-3	Quiz, Lab Exam, Term Exam	Rubric for Final Term Exam
CO3	*Apply* error control codes to detect and/or correct transmission error with a trade-off between error detection capability and throughput.	PO-a-4	Quiz, Term Exam	Rubric for Quiz, Term Exam
CO4	*Determine* and *demonstrate* various types of IP addressing techniques.	PO-b-3	Quiz, Lab Exam, Term Exam	Rubric for Quiz, Term Exam
CO5	*Evaluate* and i*nvestigate* solution of complex engineering problem by combination of information to provide valid conclusions.	PO-d-3	Term Exam	Rubric for Term Exam

XIII – Evaluation and Assessment Criteria

CO1: *Determine* various subnetting techniques to design subnets and the parameters of the subnets for complex engineering problems through appropriate investigation

Assessment Criteria	Not Attended/ Incorrect (0)	Inadequate (1)	Satisfactory (2)	Excellent (3)
Content knowledge	Does not demonstrate the knowledge of subnetting	Demonstrate a primary understanding of subnetting concepts	Demonstrate a partial understanding of subnetting	Demonstrate a clear understanding of subnetting techniques.

	principles and cannot define key terms.	and answer with limited explanation.	techniques with proper use of the key terms.	
Creation of the subnets	Does not create the subnets for the problem analysis.	Attempt to investigate the subnet creation with lack of essential information or parameters.	Partially create the subnets, with limited clarification of concepts.	Properly create the subnets and clarify the concept.
Calculation of FLSM/VLSM	Does not calculate the values accurately or provide incorrect logic.	Attempt to calculate the FLSM/VLSM but lacks justification or presents the solution inadequately.	Apply subnetting techniques with moderate accuracy of calculation.	Values are calculated correctly with proper logic.
Submission	No attempt of applying the subnetting technique with no solution provided.	The solution is submitted with inaccuracy.	The solution is submitted with partial accuracy within time.	The solution is submitted within due time.

CO2: *Develop* different network design by using modern engineering tools for modeling of different network topologies considering complex engineering problems				
Assessment Criteria	**Not Attended/ Incorrect (0)**	**Inadequate (1)**	**Satisfactory (2)**	**Excellent (3)**
Problem Analysis	Could not identify the problem and design the solution according to the provided scenario.	Perform the analysis partially such as, identify the number of subnets. However, could not complete the full subnetting.	Perform the subnetting part and demonstrate the solution mostly.	Clearly identifies and summarizes a particular task.
Correctness	Identification and the solution presented with major error.	Most of the network design of the scenario and configuration presented with minor error.	The network design of the scenario is almost correct and significant part of the demonstration is working accurately	The task is properly solved and demonstrated.
Submission	The solution is not submitted within due time following instructions.	The solution submitted within due time does not follow all the instructions.	The solution is submitted within due time but with several flaws in accordance with the instructions.	The solution is submitted within due time following instructions.

CO3: *Apply* error control codes to detect and/or correct transmission error with a trade-off between error detection capability and throughput.				
Assessment Criteria	**Not Attended/ Incorrect (0)**	**Inadequate (1)**	**Satisfactory (2)**	**Excellent (3)**
Necessity	Able to explain the reasons with major errors.	Able to explain the reasons with minor errors.	Not able to explain the reasons clearly.	Able to explain the knowledge and reasons clearly.

Correctness	Attempt to do graph related calculation with major errors.	Graph related calculation done with few logical errors.	Calculated with logic containing unclear explanation.	Given problem is perfectly calculated with proper logic.
Argumentation	Attempt to explain conflicting requirements with major errors.	Attempt to explain conflicting requirements with minor errors.	Failed to present clear concepts of conflicting requirements.	Successfully present clear concepts and explain comprehensive conflicting requirements.

CO4: *Determine* and *demonstrate* various types of IP addressing techniques.

Assessment Criteria	Not Attended/ Incorrect (0)	Inadequate (1)	Satisfactory (2)	Excellent (3)
Content knowledge	No demonstration of the key concepts of IP addressing techniques.	Demonstrate inconsistent understanding with incomplete demonstration or explanation of IP addressing techniques.	Discuss and investigate the IP addressing techniques with primitive content knowledge.	Demonstrate a clear understanding of IP addressing techniques.
Correctness	Cannot apply the IP addressing techniques for the given problem.	Apply IP addressing techniques but contains significant errors in calculations and solutions related to IP addressing.	Exhibits partially correct solutions with minor errors when implementing different IP addressing methods.	Given problem is solved correctly and values are demonstrated.

CO5: *Evaluate* and i*nvestigate* solution of complex engineering problem by combination of information to provide valid conclusions.

Assessment Criteria	Not Attended/ Incorrect (0)	Inadequate (1)	Satisfactory (2)	Excellent (3)
Problem Analysis	Cannot identify the problem and analyze it at all.	Cannot identify significant portion of the problem.	Able to identify the problem but with some shortcomings.	Able to analyze a particular given computer networking problem successfully.
Content Knowledge	Cannot deliver the evidence of knowledge at all.	The level of knowledge demonstration is significantly poor.	The demonstration of knowledge is significant enough.	Demonstrates the clear knowledge of computer networking for a particular given problem.
Completeness	Cannot complete any part of the problem.	A significant part of the submission is not complete and submitted within time.	The submitted solution is significantly correct.	The problem is solved correctly in time.
Argumentation	Does not provide any argument.	The argument provided is	Failed to clarify the concept.	A comprehensive argument is presented

		superficial and not clear at all.		successfully to clarify the concept.

XIV- Course Requirements

- Students are expected to attend at least 80% of the class.
- Students are expected to participate actively in the class.
- For both terms, there will be at least 2 quizzes based on the theoretical knowledge and conceptual understanding of the topic covered discussed in the classes.
- Submit report based on the given course related problems.
- Submission of assignments and projects should be in due time.

XV – Evaluation & Grading System*

The following grading system will be strictly followed in this class.

MID TERM		FINAL TERM	
Attendance	10%	Attendance	10%
Quiz	20%	Quiz	20%
Lab Exam	20%	Lab Exam	20%
Midterm written exam	50%	Final term written exam	50%
Total	100%	Total	100%
Grand Total 100% = 40% of Midterm + 60% of Final Term			

Letter	Grade Point	Numerical %
A+	4.00	90-100
A	3.75	85 - < 90
B+	3.50	80 - < 85
B	3.25	75 - < 80
C+	3.00	70 - < 75
C	2.75	65 - < 70
D+	2.50	60 - < 65
D	2.25	50 - < 60
F	0.00	< 50
I		Incomplete
W		Withdrawal
UW		Unofficially Withdrawal

** The evaluation system will be strictly followed as par with the AIUB grading policy.*
** CO attainment will be achieved with 60% of the evaluation marks.*

XVI – Textbook/ References

1. B. A. Forouzan, Data Communications and Networking, McGraw-Hill, Inc., Fourth Edition, 2007, USA.
2. J. F., Kurose, K. W. Ross, Computer Networking: A Top-Down Approach, Pearson Education, Inc., Sixth Edition, USA.
3. W. Odom, Official Cert Guide CCNA 200-301, vol. 1, Cisco Press, First Edition, 2019, USA.

4. T. Lammle, CCNA Routing and Switching, John Wily & Sons, Second Edition, 2016, USA.
5. B. A. Forouzan, TCP/IP Protocol Suite, McGraw-Hill, Inc., Fourth Edition, 2009, USA.
6. W. Stallings, Data and Computer Communication, Pearson Education, Inc., Tenth Education, 2013, USA.

XVII - List of Faculties Teaching the Course

FACULTY NAME	SIGNATURE
DR. AFSAH SHARMIN	
DR. MD. MEHEDI HASAN	
DR. MOUSUMI BALA	
DR. NAHAR SULTANA	
DR. NAZIB ABDUN NASIR	
DR. RAJARSHI ROY CHOWDHURY	
SYEDA NISHAT TASNIM	

XVIII – Verification

Prepared by: ---------- **Dr. Rajarshi Roy Chowdhury** *Assistant Professor & Course Convener* *Department of Computer Science* Date:.....	**Moderated by:** ---------- **Dr. M. Mahmudul Hasan** *Point Of Contact* *OBE Implementation Committee* Date:.....	**Checked by:** ---------- **Dr. Debajyoti Karmaker** *Head (Undergraduate Program)* *Department of Computer Science* Date:.....
Verified by: ..... **Dr. Md. Abdullah-Al-Jubair** *Director* *Faculty of Science & Information Technology* Date:.....	**Certified by:** ..... **Prof. Dr. Dip Nandi** *Associate Dean,* *Faculty of Science & Information Technology* Date:.....	**Approved by:** ..... **Mr. Mashiour Rahman** *Dean,* *Faculty of Science & Information Technology* Date:.....