



Independent University, Bangladesh

Department of Computer Science & Engineering

Course Title: Data Communication & Networking

Course Code: CSE 316 (co-offered with CSC 430 / CEN 430)

Semester: Autumn 2026

PART A - INTRODUCTION

Course:

Course Type: Core Course (Credit Hours: 3.00)

Prerequisite: CSE 211 + Lab: Algorithms

Classes begin Sunday, September 13, 2026 — 12 teaching weeks, ending December 3, 2026. The final examination follows in the University's examination week.

Sections & Class Schedule:

Section	Days	Time	Room
1	Sunday & Tuesday (ST)	2:40 – 4:10 pm	BC6009
2	Sunday & Tuesday (ST)	4:20 – 5:50 pm	C3004
3	Monday & Wednesday (MW)	4:20 – 5:50 pm	C6005

All three sections follow the same weekly plan, sit the same in-class quizzes and examinations in their own class hours, and use the same course website. Each class slot is 90 minutes, of which about 80 minutes is teaching; the remainder covers settling in and changeover.

Instructor's Details:

Mohammad Faisal Uddin, PhD

Associate Professor, Dept. of CSE

Office Room: BC 5001F

Consultation Hours: check under the teaching tab of the faculty's homepage at IUB website, or by appointment

Email: faisal@iub.edu.bd

Course Website (primary platform):

<https://bitsarebits.com> — the course runs on this site. It hosts every lecture as a narrated video with subtitles, the key mechanisms as separate narrated animations, interactive demonstrations you can experiment with, unlimited machine-generated practice with instant checking, the weekly online quizzes, and your marks.

Sign in with the Google account under which you are enrolled — normally your university account (studentID@iub.edu.bd) or the gmail address you registered with the instructor. Only enrolled students and course staff can enter the site. Each lecture is unlocked on the site about one week before it is taught in class.

Course Content:

Data communications, communication components, network topologies, network types (LAN, WAN, MAN); switching: circuit switching vs. packet switching; protocol layering, the TCP/IP protocol suite and its layers, multiplexing and demultiplexing, the OSI model, encapsulation and decapsulation; analog and digital signals,

periodic and non-periodic signals, time and frequency domains, bandwidth of composite signals; transmission of digital signals, transmission impairment (attenuation, distortion, noise, SNR, decibels); data-rate limits: Nyquist bit rate and Shannon capacity; network performance: throughput, latency, bandwidth-delay product; link-layer addressing and ARP; network-layer services and performance, IPv4 fragmentation (the basic idea and the fragment-offset calculation); IPv4 addressing: address space, classful and classless addressing, subnetting (equal and VLSM), block allocation and aggregation, DHCP, NAT, forwarding based on destination address (longest prefix match) and on labels (MPLS, the virtual-circuit approach); IPv6 addressing, autoconfiguration (EUI-64) and transition strategies; transport-layer services: ports and multiplexing, connectionless and connection-oriented protocols, Stop-and-Wait, Go-Back-N and Selective-Repeat protocols and their efficiency; TCP reliability and congestion control.

Course Objectives:

- a. Build a solid grounding in data communication fundamentals: signals, bandwidth, impairment, and the physical limits of transmission.
- b. Develop a working command of layered network architectures (TCP/IP, OSI) and encapsulation.
- c. Achieve end-to-end mastery of Internet addressing — IPv4 subnetting through IPv6 — and packet forwarding.
- d. Analyze how the transport layer achieves reliable delivery, and serve as a prelude to the formal networking course.

Course Policy:

- a. It is the student's responsibility to gather information about the assignments and covered topics during lectures missed. Regular class attendance is mandatory. According to the IUB system, students must enter the classroom within the first 10 minutes to get the attendance submitted.
- b. One weekly online quiz is assigned for every teaching week except weeks 7 and 12: it opens on Sunday at 12:00 am — after every section, including Section 3 on Wednesday, has finished the week it examines — and closes at 11:59 pm the following Saturday, so the whole weekend is inside the window. Starting a quiz opens a single timed attempt of 20 to 30 minutes — the length depends on the questions and is shown before you begin. Answers save automatically every few seconds, a dropped connection can be resumed within the same window, and the attempt submits itself when time expires. There is no resubmission. Every student receives their own numbers, so identical answers cannot be correct for two students.
- c. The approximate time and syllabus of the weekly online quizzes, classroom quizzes, midterm and final exam are given in this outline; announcements will also be given ahead of time in class and on the course website.
- d. There is no make-up for classroom quizzes or weekly online quizzes. A missed quiz counts as zero. In case of a documented illness or emergency, the instructor may, at his discretion, re-open a missed weekly online quiz with a new deadline. Make-ups for the midterm exam are available only with formal supporting documentation.

Administrative Policy:

- a. All announcements will be made on the course website (bitsarebits.com) and in class.
- b. Lecture materials — the video lecture, its animations, interactive demos and practice questions — are available on the course website before the discussion of that material in class, so students may have a cursory look beforehand.
- c. Class participation is vital for a better understanding of networking concepts; students are invited to raise questions at any point during the lecture.
- d. Students should take tutorials with the teaching assistant and/or instructor during office hours. Prior appointment is required.

Academic Dishonesty:

- a. A student who cheats, plagiarizes, or furnishes false or misleading information in the course is subject to disciplinary action up to and including an F grade in the course and/or suspension/expulsion from the University.
- b. Students must maintain the code of IUB. No collaboration whatsoever is permitted during examinations.
- c. Online assessments are individual work. Every paper is generated uniquely per student and graded on the server; submissions are logged, and anomalies (e.g., shared devices during a timed assessment) are reviewed.
- d. If you have any questions about the collaboration policy, or feel you may have violated it, please talk to the course staff. Although the course staff is obligated to deal with cheating appropriately, we are more understanding and lenient if we find out from the transgressor himself or herself rather than from a third party or by ourselves.

Non-Discrimination Policy:

The course and University policy prohibit discrimination on the basis of race, color, religion, sex, marital or parental status, national origin or ancestry, age, mental or physical disability, sexual orientation, or military status. If you see either the course instructor or any other person related to the course showing any form of discrimination, please inform the proctor's office of the wrongdoing.

Program Learning Outcome (PLO/PO) Applied:

PO	Title	Description
PO1	Engineering Knowledge	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.
PO2	Problem Analysis	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)
PO5	Modern Tool Usage	Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering problems, with an understanding of the limitations.

Course Outcomes (COs), Program Outcomes (POs) and Assessment:

CO	CO Statement	PO	Domain	Level of Learning Taxonomy	Assessment Tools
CO1	Explain data communication fundamentals, network types and topologies, the layered TCP/IP and OSI architectures, and encapsulation across the layers.	PO1	Cognitive	Level 2 – Understand	1. Weekly online quiz A1 2. Classroom Quiz 1 3. Midterm (Part A) 4. Final (Part A)
CO2	Apply signal, bandwidth, impairment and data-rate-limit concepts (Nyquist, Shannon) and performance measures (throughput, latency, bandwidth-delay product) to compute the limits of physical transmission.	PO1	Cognitive	Level 3 – Apply	1. Weekly online quizzes A2, A3, A5 2. Midterm (Part B) 3. Final (Part B)

CO	CO Statement	PO	Domain	Level of Learning Taxonomy	Assessment Tools
CO3	Analyse and solve Internet addressing problems end to end: IPv4 classless addressing, equal and variable-length subnetting, block allocation and aggregation, forwarding by longest prefix match and by MPLS labels, DHCP/NAT, and IPv6 addressing with autoconfiguration.	PO2	Cognitive	Level 4 – Analyze	1. Weekly online quizzes A4, A6, A7, A8, A9, A10 2. Classroom Quiz 2 3. Midterm (Part C) 4. Final (Part C)
CO4	Analyse transport-layer reliability mechanisms — ports and multiplexing, Stop-and-Wait, Go-Back-N and Selective-Repeat sliding-window protocols with their efficiency, and TCP congestion control — and evaluate their utilisation.	PO2	Cognitive	Level 4 – Analyze	1. Final (Part D)
CO5	Configure and verify switched and routed internetworks on Cisco IOS using Packet Tracer (assessed entirely in CSE 316L)	PO5	Psychomotor	Level 3 – Guided Response	1. CSE 316L laboratory work (out of 100, scaled to 25)

PART B - CONTENT OF THE COURSE

Class & Exam Schedule, Topics and Readings:

Week	Dates (2026)	Lectures	Lecture Outcomes	Readings	CO
Week 1	Sep 13–17	S01 — What is data communication? S02 — Networks, topologies, switching	1. Data communication components; data flow 2. Network types (LAN/WAN), topologies 3. Circuit vs packet switching	Forouzan §1.1–1.3	CO1
Week 2	Sep 20–24	S03 — Layers, encapsulation, OSI S04 — Signals & digital transmission Weekly online Quiz - A1	1. TCP/IP & OSI models; encapsulation per layer 2. Signals and bandwidth; bit rate, bit length, levels	Forouzan Ch 2, §3.1–3.3	CO1, CO2
Week 3	Sep 27–Oct 1	S05 — Impairments & channel limits S06 — Performance Weekly online Quiz – A2	1. Attenuation, dB, noise, SNR; Nyquist and Shannon 2. Throughput, latency, bandwidth-delay product	Forouzan §3.4–3.6	CO2
Week 4	Oct 4–8	S07 — Data link & ARP S08 — Network layer & congestion Weekly online Quiz – A3	1. Link-layer addressing; ARP resolution 2. Packet switching; network-layer performance, congestion 3. IPv4 fragmentation: MTU, fragment count, offset	Forouzan §9.1–9.2, §18.1–18.3	CO1, CO3

Week	Dates (2026)	Lectures	Lecture Outcomes	Readings	CO
Week 5	Oct 11–15	S09 — IPv4: address space, classful - QUIZ 1 (first 30 min) S10 — Classless: prefixes and masks Weekly online Quiz – A4 QUIZ 1 — in class, Week 5 Class 1	1. IPv4 address space; classful addressing 2. Classless addressing: prefixes, masks	Forouzan §18.4	CO3
Week 6	Oct 18–22	S11 — Block arithmetic S12 — Subnetting I: equal Weekly online Quiz – A5	1. Block size, first/last address 2. Subnetting a block into equal sub-blocks	Forouzan §18.4	CO3
Week 7	Oct 25–29	S13 — Midterm review clinic MIDTERM EXAMINATION Date fixed by the Dept. — between 27 and 31 October (Co-ordinated all sections together by the dept.) Weekly online Quiz – A6	1. Comprehensive review: Ch 1–3, Ch 9, §18.1–18.4	Forouzan Ch 1–3, 9, §18.1–18.4	CO1–CO3
Week 8	Nov 1–5	S14 — Subnetting II: unequal (VLSM) S15 — The ISP allocation problem	1. Variable-length subnetting 2. Address allocation by an ISP, worked end to end	Forouzan §18.4	CO3
Week 9	Nov 8–12	S16 — Aggregation & supernetting S17 — Forwarding: LPM, DHCP, NAT Weekly online Quiz – A7	1. Address aggregation; longest prefix match 2. DHCP; NAT; forwarding tables	Forouzan §18.4–18.5	CO3
Week 10	Nov 15–19	S18 — MPLS & the virtual-circuit approach S19 — IPv6 I: notation, types Weekly online Quiz – A8	1. Label forwarding (MPLS); virtual circuits 2. IPv6 notation/abbreviation; address types	Forouzan §18.2, §18.5, §22.1	CO3
Week 11	Nov 22–26	S20 — IPv6 II: EUI-64, transition - QUIZ 2 (first 30 min) S21 — Transport: ports, multiplexing Weekly online Quiz – A9 QUIZ 2 — in class, Week 11 Class 1	1. Autoconfiguration (EUI-64); transition strategies 2. Transport services; port addressing	Forouzan §22.1–22.2, §23.1	CO3, CO4
Week 12	Nov 29–Dec 3	S22 — ARQ: Stop-and-Wait, Go-Back-N, Selective Repeat S23 — TCP: reliability & congestion; course close Weekly online Quiz – A10 Last week of classes (ends Dec 3)	1. ARQ protocols and their efficiency (utilization) 2. TCP reliability; congestion control (slow start, AIMD)	Forouzan §23.1–23.2, §24.3	CO4
Exam week	per Dept. schedule	FINAL EXAMINATION Co-ordinated all sections together	Comprehensive, with emphasis on post-midterm material	Forouzan Ch 1–3, 9, 18, 22–24	CO1–CO4

PART C - ASSESSMENT AND EVALUATION

Assessment Pattern:

- a. Weekly online quizzes: 10 in total, on the course website, opening in weeks 2–7 and 9–12. Each carries 20 marks and examines only the week that finished before it opened, so nothing is ever asked before every section has been taught it — A1 covers Week 1, A2 Week 2, A3 Week 3, A4 Week 4, A5 Week 5, A6 Week 6, A7 Week 8, A8 Week 9, A9 Week 10 and A10 Week 11. Week 7 teaches no new material (midterm review, then the midterm) and Week 12 finishes too late to be quizzed before the final, so neither has a quiz of its own; both are examined in the final. The time allowed varies with the questions and is shown before you start: 20 minutes for the shorter papers, up to 30 for the subnetting ones where a single allocation problem is long work. Single attempt, auto-graded, per-student numbers. Because each quiz follows its own week, its outcome follows the syllabus: A1 assesses CO1 and counts for 2 marks; A2, A3 and A5 assess CO2 and the best 2 count for 4 marks; A4 and A6 to A10 assess CO3 and the best 5 count for 9 marks — the best 8 of 10 in all, for the 15 marks in the table below.
- b. Classroom quizzes: 2 in total, written on paper in class — 30 minutes and 20 marks each, scaled to 7 and 8 respectively. Quiz 1 (Week 5, Class 1, first 30 minutes) covers Weeks 1–4; Quiz 2 (Week 11, Class 1, first 30 minutes) covers Weeks 6–10. Several versions of every paper circulate in the room, each with its own numbers, and the version letter is printed on the paper.
- c. Midterm examination: Week 7, co-ordinated for all sections together by the department. The exact date is fixed by the Department and had not been announced when this outline was issued; it will fall between 27 and 31 October and will be announced in class and on the course website. 75 minutes, 60 marks — Part A 16 (CO1) + Part B 20 (CO2) + Part C 24 (CO3), scaled to 30. Syllabus: Weeks 1–6 (Forouzan Ch 1–3, Ch 9, §18.1–18.4 through equal subnetting).
- d. Final examination: comprehensive — it covers the whole course, with the weight of the marks on post-midterm material (three quarters of them). Held during the University's examination week, co-ordinated for all sections. 110 minutes, 80 marks in four parts — Part A 8 (CO1, fundamentals and layering) + Part B 12 (CO2, signals and data-rate limits) + Part C 28 (CO3, Internet addressing end to end) + Part D 32 (CO4, transport reliability) — scaled to 40.

CIE - Continuous Internal Evaluation (30 Marks):

Blooms Category	Weekly Online Quizzes (15)	Classroom Quizzes (15)
Remember		
Understand	2	5
Apply	4	5
Analyze	9	5
Evaluate		
Create		

SMEE - Semester Mid & End Examination (70 Marks):

Blooms Category	Midterm (30)	Final (40)
Remember	5	
Understand	5	4
Apply	10	6
Analyze	10	20

Blooms Category	Midterm (30)	Final (40)
Evaluate		10
Create		

Assessment and Evaluation Distribution:

Students will be assessed on the basis of their overall performance in all the exams, classroom quizzes and weekly online quizzes. CSE 316 and its laboratory CSE 316L are graded together: the 100 marks below are weighted to 75, the laboratory contributes 25, and one letter grade is awarded for both courses.

- Weekly online quizzes (best 8 of 10) — 15%
- Classroom quizzes (2 out of 2) — 15%
- Midterm examination — 30%
- Final examination — 40%
- CSE 316 total (the four components above) — 75% of the joint mark
- CSE 316L laboratory (CO5) — marked out of 100 in the laboratory; 25% of that, so 25 marks, is added
- The joint CSE 316 / CSE 316L grade: CSE 316 carries 3 credits and CSE 316L carries 1. They are graded together and a student receives the same letter grade for both. The 100 marks of CSE 316 are scaled to 75; the laboratory is marked out of 100 by the laboratory section and 25% of that mark — 25 marks — is added; the grade conversion below is then applied to the combined 100. CO1 to CO4 are assessed in CSE 316 and carry 75 of the joint marks between them; CO5 is assessed in CSE 316L and carries the remaining 25.

CO-wise Mark Distribution and Attainment:

CO	Assessed through	Marks mapped	Attainment threshold	Of the joint 100
CO1	Weekly online quiz A1 (2) + Classroom Quiz 1 (7) + Midterm Part A (8) + Final Part A (4)	21	45%	15.75
CO2	Weekly online quizzes A2, A3, A5, best 2 of 3 (4) + Midterm Part B (10) + Final Part B (6)	20	45%	15
CO3	Weekly online quizzes A4, A6, A7, A8, A9, A10, best 5 of 6 (9) + Classroom Quiz 2 (8) + Midterm Part C (12) + Final Part C (14)	43	45%	32.25
CO4	Final Part D (16)	16	45%	12
CO5	CSE 316L laboratory work — 100 marks scaled to 25	—	45%	25

A student attains a CO by earning at least 45% of the marks mapped to it. “Marks mapped” is out of CSE 316’s own 100; “of the joint 100” is the same outcome after CSE 316 is weighted to 75 and CSE 316L’s 25 is added, which is the basis of the shared grade. Every examination paper and online quiz is tagged with its CO(s); attainment is compiled automatically in the OBE grade sheet and reported per section for CQI.

Grade Conversion Scheme:

The following chart will be followed for final grading for this course. [Numbers are inclusive]:

A	A-	B+	B	B-	C+	C	C-	D+	D	F
90-100	85-89	80-84	75-79	70-74	65-69	60-64	55-59	50-54	45-49	0-44

PART D - LEARNING RESOURCES

Required Text (Mandatory):

The course will be based mostly on the following book:

- a. Behrouz Forouzan, Data Communications and Networking, 5th Ed., McGraw-Hill

Reference Materials:

Following is an optional reference material to study and know more about the topics:

- a. Wayne Tomasi, Introduction to Data Communications and Networking, Pearson

Course Website Resources:

On <https://bitsarebits.com> every session provides: the full lecture as a narrated video with subtitles, the key mechanisms as separate narrated animations that keep their voice-over, interactive demonstrations to experiment with, and unlimited auto-checked practice questions with fresh numbers on every attempt.