

GAU, Faculty of Engineering

Course Unit Title	Data Communications	
Course Unit Code	CEN415	
Type of Course Unit	Technical elective for CEN, SE, AIE, EEN	
Level of Course Unit	4th year BSc	
National Credits	3	
Number of ECTS Credits Allocated	6	
Theoretical (hour/week)	3	
Practice (hour/week)	0	
Laboratory (hour/week)	0	
Year of Study	4	
Semester when the course unit is delivered	7	
Mode of Delivery	Face to face	
Language of Instruction	English	
Prerequisites	-	
Corequisites	-	
Recommended Optional Programme Components		
Objectives of the Course:		
<ul style="list-style-type: none"> • To introduce the fundamental principles and techniques of data and computer communications. • To provide an overview of networking concepts, protocol architectures, and layered communication models. • To teach modulation, coding, and encoding techniques used in modern data communication systems. • To explain multiplexing methods and their applications in efficient data transmission 		
Learning Outcomes		
When this course has been completed the student should be able to		Assess.
1	Explain the principles of layered communication architectures and compare the functionalities of the OSI and TCP/IP reference models.	1
2	Analyze the characteristics, advantages, and limitations of guided and wireless transmission media for different data communication applications.	1,3
3	Apply signal encoding, modulation, and multiplexing techniques used in modern data communication systems.	1,3
4	Evaluate fundamental data transmission performance metrics, including bandwidth, data rate, transmission impairments, and error control mechanisms.	1,3
5	Analyze and solve basic engineering problems related to digital data communication and analog-to-digital conversion techniques.	1
Assessment Methods: 1. Written Exam, 2. Oral Exam, 3. Assignment, 4. Project/Report, 5. Presentation, 6. Lab Work		
Course's Contribution to Program		
		CL
1	Ability to understand and apply knowledge of mathematics, science, and engineering	3
2	Ability to design and conduct experiments as well as to analyze and interpret	1
3	Ability to work in multidisciplinary teams while exhibiting professional responsibility and ethical conduct	1
4	Ability to apply systems thinking in problem solving	1
5	Knowledge of contemporary issues while continuing to engage in lifelong learning	4

6	Ability to use the techniques, skills and modern engineering tools necessary for engineering practice	3
7	Ability to express their ideas and findings, in written and oral form	2
8	Ability to design and integrate systems, components or processes to meet desired needs within realistic constraints	4
9	Ability to approach engineering problems and effects of their possible solutions within a well structured, ethically responsible and professional manner	4

CL: Contribution Level (1: Low, 2: Medium, 3: High)

Course Contents

Week	Chapter	Subject	Exams
1		Introduction to Data Communications and Networking	
2		Network types and applications, Internet overview	
3		Protocol Architectures: OSI reference model, TCP/IP protocol suite	
4		Analog and digital signals	
5		Transmission impairments, Channel capacity and performance metrics	
6		Guided and Wireless Transmission Media	
7		Guided and Wireless Transmission Media	
8			Midterm
9		Signal Encoding and Modulation: Analog-to-digital conversion	
10		Signal Encoding and Modulation: Digital-to-digital encoding	
11		Signal Encoding and Modulation: Digital modulation techniques	
12		Data Link Control	
13		Multiplexing and Multiple Access Techniques	
14		Multiplexing and Multiple Access Techniques	
15			Final

Recommended Sources

- W. Stallings, Data and Computer Communications, 10th ed., Pearson, 2013

Assessment

Midterm	25 %
Final exam	45 %
Quiz	15 %
Assignments	10 %
Attendance	5 %

ECTS Allocated Based on the Student Workload

Activities	Number	Duration (hour)	Total Workload (hour)
In-class lecture (including exam weeks)	15	3	45
Midterm exam	1	1.5	1.5
Midterm exam preparation	1	20	20
Final exam	1	1.5	1.5
Final exam preparation	1	20	20
Quiz	2	3	6
Assignment	10	3	30
Project/presentation/report writing	0	0	0
Lab and tutorial	0	0	0

Self-study	15	3	45
Total Workload			169.00
Total Workload / 30 (h)			5.63
ECTS Credit of the Course			6