



Lahore University of Management Sciences

EE380: Communication Systems

Fall 2023

Course Catalog Description

This course provides an overview of information communication systems. Topics include analog and digital modulation in baseband and pass-band. We also provide coverage of sampling and quantization techniques. In this course, system design is given primary importance by using examples from practical systems. This is supported by allied labs and simulations.

Course Details

Credit Hours	3 (Theory) + 1 (Lab)
Core	Core
Elective	May meet elective requirements for some students with background in Signals and Systems
Open for Student Category	All
Closed for Student Category	None

Course Prerequisite(s)/Co-Requisite(s)

Pre-requisites: Signals and Systems (EE310), Basic knowledge of probability theory

Co-requisites: None

Course Basics

Credit Hours	3 (Theory) + 1 (Lab)			
Lecture(s)	Nbr of Lec(s) Per Week	2	Duration	75 mins each
Recitation/Lab (per week)	Nbr of Lec(s) Per Week	0/1	Duration	0 minutes/150 minutes
Tutorial (per week)	Nbr of Lec(s) Per Week		Duration	

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TA Office Hours	TBA
Course URL (if any)	The course material will be available on LMS

COURSE TEACHING METHODOLOGY (PLEASE MENTION FOLLOWING DETAILS IN PLAIN TEXT)

- Teaching Methodology: Classes are planned to be on campus and in-person lectures will be delivered in the classroom. If we are forced to move online, then synchronous lectures will be carried during the scheduled time.
- Lecture details: All lecture will be held in the scheduled time in the classroom.

Grading Breakup and Policy

(Tentative)
Assignment(s)/Home Work (5-6): 15%
Quiz(s) (4-5): 15%
Midterm Examination(s): 30%
Final Examination: 40%



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Harassment Policy

SSE, LUMS and particularly this class, is a harassment free zone. There is absolutely zero tolerance for any behaviour that is intended, or has the expected result of making anyone uncomfortable and negatively impacts the class environment, or any individual's ability to work to the best of their potential.

In case a differently-abled student requires accommodations for fully participating in the course, students are advised to contact the instructor so that they can be facilitated accordingly.

If you think that you may be a victim of harassment, or if you have observed any harassment occurring in the purview of this class, please reach out and speak to me. If you are a victim, I strongly encourage you to reach out to the Office of Accessibility and Inclusion at oai@lums.edu.pk or the sexual harassment inquiry committee at harassment@lums.edu.pk for any queries, clarifications, or advice. You may choose to file an informal or a formal complaint to put an end of offending behavior. You can find more details regarding the LUMS sexual harassment policy [here](#).

To file a complaint, please write to harassment@lums.edu.pk.

SSE Council on Equity and Belonging

In addition to LUMS resources, SSE's **Council on Belonging and Equity** is committed to devising ways to provide a safe, inclusive and respectful learning environment for students, faculty and staff. To seek counsel related to any issues, please feel free to approach either a member of the council or email at cbe.sse@lums.edu.pk

Rights and Code of Conduct for Online Teaching

A misuse of online modes of communication is unacceptable. TAs and Faculty will seek consent before the recording of live online lectures or tutorials. Please ensure if you do not wish to be recorded during a session to inform the faculty member. Please also ensure that you prioritize formal means of communication (email, lms) over informal means to communicate with course staff.

Course Learning Outcomes

EE380-	The students should be able to:
CLO1:	Solve problems related to the fundamentals of amplitude modulation.
CLO2:	Analyze the performance of frequency modulation (FM) and its spectral analysis.
CLO3:	Compare different performance metrics of analog communication schemes for example transmitted power, receiver complexity and bandwidth.
CLO4:	Analyze analog to digital conversion.
CLO 5:	Evaluate the performance of digital Communication Systems (Baseband)

Relation to EE Program Outcomes

EE-380 CLOs	Related PLOs	Levels of Learning	Teaching Methods	CLO Attainment checked in
CLO1	PLO 2	Cog-3	Instruction, Assignments	Assignments, Midterm, Final
CLO2	PLO 2	Cog-4	Instruction, Assignments	Assignments, Midterm, Final
CLO3	PLO 2	Cog-4	Instruction, Assignments	Assignments, Midterm, Final
CLO4	PLO 2	Cog-4	Instruction, Assignments	Assignments, Midterm, Final
CLO5	PLO 3	Cog-4	Instruction, Assignment	Assignments, Final, CEP



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Complex Engineering Problem/Activity:	
Complex Engineering Problem Details	<p>Included: Yes</p> <p>Nature and details of Complex Engineering Problem: It will be given in one of the assignment where the students will determine system design parameters (e.g. type of modulation scheme, transmitted power etc.) for a digital communication system for specific design parameters (e.g. BER, received SNR etc.)</p> <p>Attributes: WP1, WP2 and WP4</p> <p>WP1: Depth of knowledge required WP2: Range of conflicting requirements WP4: Involve infrequently encountered issues</p> <p>Assessment in: Final /Assignment</p>
Complex Engineering Activity Details	<p>Included: No</p> <p>Nature and details of Complex Engineering Activity: Assessment in: Midterm/Final/Quiz/Assignment</p>

Course Overview			
Week No.	Topics	Book Chapters/ Recommended Reading	Related CLOs & Additional Remarks
1	Introduction to Communication Systems	Ch.1 / handouts	CLO 1
1-3	Signals, Spectra and Filtering	Ch.2-3	CLO 1
3-5	Amplitude Modulation and Demodulation	Ch. 4	CLO 1
6-8	Angle CW Modulation and Demodulation, Superheterodyne receiver	Ch. 5	CLO 1, CLO 2
Mid-term			
8-10	Sampling and Pulse Modulation	Ch. 6	CLO 3
10-11	Probability and Random Processes	Ch. 8-9	CLO 1, CLO 2
12-13	Digital Baseband Transmission	Ch. 7	CLO 3
14	Digital Carrier Systems	Ch. 7	CLO 2



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Examination Detail	
Midterm Exam	Yes/No: Yes Combine Separate: TBA Duration: 3 hours Preferred Date: TBA Exam Specifications: TBA
Final Exam	Yes/No: Yes Combine Separate: TBA Duration: 3 hours Exam Specifications: TBA

Complex Engineering Problem/Activity:	
Complex Engineering Problem Details	Included: Yes Nature and details of Complex Engineering Problem: Assessment in Assignment

Textbook(s)/Supplementary Readings
Text Book: Modern Digital and Analog Communication Systems by B. P. Lathi and Ding (4 th or 5 th edition) Reference Books: Communications Systems by A. Bruce Carlson and Paul B. Crilly (5 th Edition) Modern Digital and Analog Communication Systems by B. P. Lathi Communication Systems by Simon Haykin and Michael Mohr Fundamentals of Communication Systems by John G. Proakis and Masoud Salehi

Prepared and Revised by:	Ijaz Haider Naqvi
Revision Date:	August 2023.