

**Course Name:** 14:332:332 Principles of Communication Systems

**Course Hour and Location:** 10:20 AM – 11:40 AM (Tues/Fri); Beck Hall Room 251

**Instructor:** Dr. Hang Liu ([hl1097@scarletmail.rutgers.edu](mailto:hl1097@scarletmail.rutgers.edu))

**Office Hour and Location:** 9:20 – 10:20 AM (Tues/Fri, or by appointment), CoRE 509

**Office Hour Zoom Link:** <https://rutgers.zoom.us/j/61097?pwd=RVNmY0ZxVXRmWjd6QzREaGZoZkVqdz09> Passcode: hl1097

**Course Canvas link:** <https://rutgers.instructure.com/courses/217156>

**Format:** The instructor will introduce concepts, solve mathematical foundations and implement the system in MATLAB.

**Course Description:** Analogy and digital communication systems is a fundamental course for electrical engineering. In this course, we will be covering the topics of communication systems, signal space, signal transmission, analog modulation and demodulation, digitalization of analog signals, and digital data transmission.

**Prerequisites:** 14:332:226 Probability and Random Process; 345 Linear systems and Signals

**Textbook:** Modern Digital and Analog Communication Systems B. P. Lathi and Zhi Ding, 5<sup>th</sup> edition.

**Academic Integrity:** The code of student conduct was created to ensure the safety and security of the Rutgers community. Please refer to [here](#) for detailed information on the Code of Conduct & Academic Integrity.

**Homework:** We will have four (4) homework during this course. The homework will be posted and submitted through CANVAS. Please start your homework early to avoid delays in submission. Each delayed day of the submission will introduce a 10%-point penalty. That said, after 10 days of delays, there is no need for submissions.

**Exams:** This course will include 1 midterm exam and 1 final exam. Each exam will take 1 hour and 20 minutes. The exam will be hosted in the classroom.

### Grading Policy:

Homework: 40%

Midterm: 25%

Final: 25%

Attendance: 10%

### Tentative Course Schedule

Week	Time	Subject	Section	Note
1	Jan 17	Syllabus and MATLAB		
	Jan 20	Comm system, channel, SNR, modulation/demodulation, history of telecom	Ch 1	

2	Jan 24	Signal classifications and operations, unit pulse signal, trigonometric Fourier series	Ch 2	
	Jan 27	Exponential Fourier series	Ch 2	
3	Jan 31	MATLAB LAB [Deriving Fourier Series and Fit it to Original Function]	Ch 2	Hw 1 out
	Feb 3	Fourier Transform and its property	Ch 3.1-3.3	
4	Feb 7	Linear system and filter	Ch 3.4-3.5	
	Feb 10	Energy and power spectral density	Ch 3.7-3.8	Hw 1 due
5	Feb 14	Recitation: HW1 and more examples for Fourier Transform	Ch 3	
	Feb 17	MATLAB LAB [Deriving filter, and apply it to a signal mixture]	Ch 3.10	Hw 2 out
6	Feb 21	Introduction to modulation and DSBSC	Ch 4.1-4.2.1	
	Feb 24	Generation of DSBSC signals (Modulator circuits)	Ch 4.2.2	
7	Feb 28	Amplitude Modulation (AM): DSB with Carrier	Ch 4.3	Hw2 due
	Mar 3	Quadrature Amplitude Modulation	Ch 4.4.2	
8	Mar 7	SSB-SC Modulation	Ch 4.4.1	Hw 3 out
	Mar 10	SSB-SC Generation and Demodulation	Ch 4.4.1	
9	Mar 14	Spring Recess (Tuesday, No Class)		
	Mar 17	Spring Recess (Friday, No Class)		
10	Mar 21	Midterm (Tuesday)		
	Mar 24	Midterm review (Friday)		
11	Mar 28	Vestigial Sideband (VSB)	Ch 4.4.3	Hw 3 due
	Mar 31	Carrier Acquisition and Big Picture of AM	Ch 4.4.4, 4.11	
12	April 4	Angle exponential modulation and instantaneous frequency	Ch 4.5	
	April 7	Narrowband and wideband FM and PM	Ch 4.6	Hw 4 out
13	April 11	FM and PM bandwidth estimation and non-linearity	Ch 4.6	
	April 14	Generation of FM and PM, FM demodulation	Ch 4.7, 4.9	
14	April 17	FM and AM super heterodyne receiver, FM stereo receiver	Ch 4.8	
	April 21	Angle modulation big picture	Ch 4.5-4.10	Hw 4 due
15	April 26	Final exam preview [No Class]		
	April 28	Final exam		