

EE 567: Communication Systems Fall 2018

Lecture: Tuesday 6:40-9:30 p.m. in RTH 109

Instructor: Christopher Wayne Walker, Ph.D.

Office: PHE 414

Office Hours: Tuesday 5:15-6:30 p.m.

Daytime phone: (213) 740-7654 – USC during office hours
or (310) 812-5176 (voicemail available)

email: chrwalke@usc.edu

TA: Haoqian Song, email: haoqians@usc.edu

Course web page: <http://www.cwwphd.com>

Texts:

Recommended: Modern Digital and Analog Communication Systems, 4th edition.

Authors: B.P. Lathi and Zhi Ding;

Recommended: Digital Communications, 2nd edition. Author: Bernard Sklar

First Lecture: Tuesday, August 21

Last Lecture: Tuesday, November 27

Course Grading Policy:

Method	Date	Weight
Homework	As assigned in class	25%
Project	Due Nov. 27	25%
Midterm	Tuesday, October 23, 6:40-8:00 p.m.	25%
Final	Tuesday, Dec. 11, 7-9 p.m.	25%

Notes: One 8 ½ x 11 sheet of notes (front and back) is allowed on the Midterm. Two such sheets are allowed on the Final. Calculators are allowed on all exams. No computers or cell phones are allowed on exams nor is any device allowed that has internet capability.

Contact Information: You are welcome to consult with me or your TA during office hours. Please consult with the TA only during his office hours (he is busy with studies like you are). If my office hours are not convenient for you or else you have a question that needs addressing before you can see me then you are welcome to call or email me. Email is the preferred method of contact if I can answer your question with an email response, but if we need to have more interaction then you are welcome to call me at my office. If you call and I cannot speak with you immediately then I will set up a time to call you back to discuss any issues or concerns you may have. I want this course to be a positive learning experience for you so please make sure you get all your questions answered.

Homework: Homework will be assigned regularly. You may work with others on the homework assignments but the work you hand in must be your own and not copied from another student. Homework is due at 6:40 p.m. on the due date. Late homework will be accepted for up to 2 days with 20% penalty.

Project: A project will be assigned and will be due at 6:40 p.m. on Nov. 27 (the last lecture). The project is to be an individual effort. You may consult with only me or the TA with questions related to the project.

Statement on Academic Conduct:

Plagiarism presenting someone else's ideas as your own, either verbatim or recast in your own words is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Section 11, Behavior Violating University Standards <https://scampus.usc.edu/1100-behavior-violating-university-standards-and-appropriate-sanctions/>. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, <http://policy.usc.edu/scientific-misconduct/>.

Discrimination, sexual assault, and harassment are not tolerated by the university. You are encouraged to report any incidents to the Office of Equity and Diversity <http://equity.usc.edu/> or to the Department of Public Safety <http://capsnet.usc.edu/department/department-public-safety/online-forms/contact-us>. This is important for the safety of the whole USC community. Another member of the university community such as a friend, classmate, advisor, or faculty member can help initiate the report, or can initiate the report on behalf of another person. The Center for Women and Men <http://www.usc.edu/student-affairs/cwm/> provides 24/7 confidential support, and the sexual assault resource center webpage sarc@usc.edu describes reporting options and other resources.

Statement for Students with Disabilities:

A number of USC's schools provide support for students who need help with scholarly writing. Check with your advisor or program staff to find out more. Students whose primary language is not English should check with the American Language Institute <http://dornsife.usc.edu/ali>, which sponsors courses and workshops specifically for international graduate students. The Office of Disability Services and Programs <http://sait.usc.edu/academicsupport/centerprograms/dsp/homeindex.html> provides certification for students with disabilities and helps arrange the relevant accommodations. If an officially declared emergency makes travel to campus infeasible, USC Emergency Information <http://emergency.usc.edu/will> provide safety and other updates, including ways in which instruction will be continued by means of blackboard, teleconferencing, and other technology.

EE 567 Outline

Fall 2018

Inst: C.W. Walker

Section	Title
1.0	Review of Fourier Transforms
2.0	Introduction to Communication Systems
	Transmitter
	Channel
	Receiver
3.0	Signaling Techniques
	Analog Communications
	Digital Communication
	Baseband Systems
4.0	Spectral Concepts
	Bandwidth
	SNR
	Frequency Bands
	Lowpass and Bandpass Signals
	Bandpass Systems
	Representation of Bandpass Systems
	Representation of Linear Bandpass Systems
	Response of a Bandpass System to a Bandpass Signal
5.0	Analog Modulation and Demodulation Techniques
	Amplitude Modulation
	Bandwidth Efficient Amplitude Modulation
	Frequency Division Multiplexing
	Angle Modulation
	Phase Modulation
	Frequency Modulation
	Bandwidth of FM Waves
	Generation of FM Waves
	Demodulation of FM Signals
	Frequency Discrimination
	Phase-Locked Loop Demodulation
6.0	Bandpass Systems
	Representation of Bandpass Systems
	Representation of Linear Bandpass Systems
	Response of a Bandpass System to a Bandpass Signal

7.0	Probability and Random Processes
	Probability and Random Processes in Communication Systems
	Noise in Communication Systems
	Spectral Analysis
8.0	Basic Antenna Concepts
9.0	Sampling and A/D Conversion
10.0	Digital Signaling Techniques and Performance
	AWGN Channel
	BPSK, QPSK, MPSK Modulation
	FSK, MSK, QAM Modulation
	Effect of Coding on BER Performance
11.0	Receiver Design
	Carrier Acquisition and Tracking with Phase-Locked Loops
	Synchronization
	Scramblers
	Noise Figure
12.0	Signal Detection Techniques
	Correlation Detection
	Matched Filter Detection
	Square Law Detection/Radiometer
	M of N Detection
13.0	Spread Spectrum Communications and Multiple Access Channels
	PN Spreading Codes
	DS-CDMA
	TDMA
	FDMA
	Chaotic Waveforms
14.0	Miscellaneous Topics
	Link Budgets
	Channel Capacity
	TDOA/FDOA
	Eye Diagram
	Intersymbol Interference
	Jamming and Anti-jamming Techniques
	Fading Channel
	Channelizers
	Channel Equalization
	Geolocation

The above outline is tentative and may change if circumstances warrant.