

EE 470: Electronic Communication Theory

Fall 2019
Room: KC131
Days: MWF
Time: 8:00-8:50 A.M.

Instructor: Dr. Tony Richardson
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Description: EE 470 Electronic Communication Theory (3) This is a senior-level course covering both analog and digital electronic communication theory in a single one-semester course. Topics include (1) baseband communication with applications in the traditional (landline) telephone system and digital recording systems (CD, MP3), (2) amplitude modulation with applications in AM radio and broadcast television (traditional and HDTV), (3) frequency modulation with applications in FM radio and (4) phase modulation with applications in computer WiFi networks. Prerequisite: EE 310

Credit Hour Policy: This course meets the federal requirements of 15 in-class hours plus an expected 30 hours of out-of-class work per credit hour over a semester. (At least 135 hours total; 9 per week)

Text:

S Haykin, M Moher, *Intro. to Analog & Digital Communications, 2nd Edition*, © 2007, John Wiley & Sons, Inc, 0-471-43222-9

Grading: The course grade will consist of the components listed in the table below. There will be three midterm exams and a comprehensive final exam. The project assignments will be a mix of software (simulation) and hardware exercises. Homework assignments will be given on an approximately weekly basis. Short quizzes will typically be given at the beginning of every lecture period. The quizzes are used as a means to encourage regular and on-time attendance.

Item	Weight
Three Midterm Exams	45%
Final Exam	20%
Projects	15%
Homework	10%
Quizzes	10%

Class Policies: Students are expected to abide by the Academic Honor Code. No aid should be given or requested on any examination. Students may collaborate on homework (in fact, this is encouraged), but each student must submit their own work. Each student is expected to be able to recreate any homework solutions submitted.

Disability Policy: It is the policy and practice of the University of Evansville to make reasonable accommodations for students with properly documented disabilities. Students should contact the Office of Counseling and Health Education at 488-2663 to seek services or accommodations for disabilities. Written notification to faculty from the Office of Counseling and Health Education is required for academic accommodations.

Class Communication: To receive notifications (class reminders, assignment hints and corrections, answers to exam questions, etc) from the instructor related to this course do one (or both) of the following: (1) text @ue-ee470 to 81010 (or 812-301-1469) to receive notifications by text, (2) send email (empty subject and body are ok) to ue-ee470@mail.remind.com to receive notifications by email. Alternatively, browse to remind.com/join/ue-ee470 to join OR install the Remind app on your smart phone/pad (Apple, Android) to join and receive notifications. To receive more general notifications from Dr. Richardson (class cancellations, departmental event reminders, winning lottery numbers, etc) please also text @ue-rich to 81010 (or 812-301-1469) or send email to ue-rich@mail.remind.com. Note that I remove all participants from all of my Remind classes at the end of the every semester, so you will need to rejoin the ue-rich class even if you have previously been a member.

Lecture Schedule

This schedule is tentative. The instructor reserves the right to change it.

<i>Monday</i>	<i>Wednesday</i>	<i>Friday</i>
	Period 1 (Aug 21) S 1.1-1.5: Introduction	Period 2 (Aug 23) S 2.1: Fourier Transform (FT) Definition
Period 3 (Aug 26) S 2.2: Properties of the FT	Period 4 (Aug 28) S 2.3-2.4: Time-Bandwidth, Dirac Delta Function	Period 5 (Aug 30) S 2.5-2.6: FT of Periodic Signals, Convolution
Sep 2 Labor Day NO CLASS	Period 6 (Sep 4) S 2.7: Ideal Low-Pass Filters	Period 7 (Sep 6) S 2.8-2.9: Correlation, Spectral Density
Period 8 (Sep 9) S 3.1: Amplitude Modulation (AM)	Period 9 (Sep 11) S 3.1-3.2: Amplitude Modulation, cont	Period 10 (Sep 13) S 3.3: Double Sideband-Suppressed Carrier
Period 11 (Sep 16) S 3.4-3.5: Costas Receiver, Quadrature AM	Period 12 (Sep 18) S 3.6: Single-Sideband Modulation	Period 13 (Sep 20) S 3.7-3.8: Vestigial Sideband Modulation (VSB), Baseband Representation
Period 14 (Sep 23) S 3.9: Superheterodyne Receiver	Period 15 (Sep 25) S 3.9: Analog TV, Freq Division Multiplexing (FDM), Exam Review	Period 16 (Sep 27) EXAM I Chapters 1 - 3
Period 17 (Sep 30) S 4.1-4.2: Angle Modulation Definition	Period 18 (Oct 2) S 4.3-4.4: Phase Mod vs Frequency Mod (FM), Narrowband FM	Period 19 (Oct 4) S 4.5: Wideband FM
Oct 7 Fall Break NO CLASS	Period 20 (Oct 9) S 4.6: FM Bandwidth	Period 21 (Oct 11) S 4.7-4.8: FM Generation
Period 22 (Oct 14) S 4.8: FM Demodulation	Period 23 (Oct 16) S 4.9: FM Stereo	Period 24 (Oct 18) S 5.1: Baseband Sampling
Period 25 (Oct 21) S 5.2: Pulse Amplitude Modulation (PAM)	Period 26 (Oct 23) S 5.3-5.4: Pulse Position Modulation (PPM)	Period 27 (Oct 25) S 5.5-5.6: Quantization, Pulse Code Mod (PCM)
Period 28 (Oct 28) S 5.7: Delta Modulation	Period 29 (Oct 30) S 5.8-5.9: Differential PCM, Line Codes	Period 30 (Nov 1) S 5.10: Time Division Multiplexing (TDM), Exam Review
Period 31 (Nov 4) EXAM II Chapters 4 - 5	Period 32 (Nov 6) S 6.1-6.3: Intersymbol Interference (ISI)	Period 33 (Nov 8) S 6.4: Raised-Cosine Pulses
Period 34 (Nov 11) S 6.5-6.8: M-ary Data, Eye Patterns	Period 35 (Nov 13) S 7.1-7.2: Digital Modulation, Amplitude Shift Keying (ASK)	Period 36 (Nov 15) S 7.3: Phase-Shift Keying (PSK)
Period 37 (Nov 18) S 7.4: Frequency Shift Keying (FSK)	Period 38 (Nov 20) S 7.5-7.6: Noncoherent Digital Comm	Period 39 (Nov 22) S 7.7-7.8: M-ary Modulation, Signal Constellations
Period 40 (Nov 25) S 7.9: Orthogonal FDM, Digital TV Exam Review	Nov 27 Thanksgiving Break NO CLASS	Nov 29 Thanksgiving Break NO CLASS
Period 41 (Dec 2) EXAM III Chapters 6 - 7	Period 42 (Dec 4) Final Exam Review	

The Final Exam is on Monday, December 9th at 8:00 AM