

ECE 5007 (Approved): Communications Laboratory

Course Description

A laboratory in analog and digital data communications using a software-defined radio platform; amplitude modulation, frequency modulation, timing recovery, pulse shaping, phase shift keyed modulation.

Prior Course Number: 4007

Transcript Abbreviation: Comm Laboratory

Grading Plan: Letter Grade

Course Deliveries: Classroom

Course Levels: Undergrad, Graduate

Student Ranks: Junior, Senior, Masters, Doctoral

Course Offerings: Spring

Flex Scheduled Course: Never

Course Frequency: Every Year

Course Length: 14 Week

Credits: 0.5

Repeatable: No

Time Distribution: 3.0 hr Lab

Expected out-of-class hours per week: -1.5

Graded Component: Laboratory

Credit by Examination: No

Admission Condition: No

Off Campus: Never

Campus Locations: Columbus

Prerequisites and Co-requisites: Prereq or concur: 5000 (501), and enrollment in ECE or EngPhysics major; or Grad standing in ECE.

Exclusions: Not open to students with credit for 4007 or 508.

Cross-Listings:

Course Rationale: We are proposing to change existing course 4007 to 5007 so that graduate students can take it, thereby helping with their graduate projects/theses.

The course is required for this unit's degrees, majors, and/or minors: No

The course is a GEC: No

The course is an elective (for this or other units) or is a service course for other units: Yes

Subject/CIP Code: 14.1001

Subsidy Level: Doctoral Course

Programs

Abbreviation	Description
CpE	Computer Engineering
EE	Electrical Engineering

General Information

Class meeting pattern: three hour laboratory sessions every other week. The intention is to use the same lab facilities as ECE 5207, on alternating weeks.

Course Goals

Includes and features measurement of radio frequency (RF) signals to provide students a valuable hands-on experience with RF signals through the laboratory experiments
Through implementation and testing of a quadrature receiver, students will apply concepts of sampling, aliasing, filtering, mixing, and complex base-band signal representation
Implement receivers for AM and FM modulations
Implement packet communications using phase shift keyed modulation; preambles will be used for timing and phase recovery. Students will measure bit error rates
Digital receiver techniques developed in lab are needed in many commercial applications (e.g. magnetic resonance imaging & radar). Students gain appreciation for wider application of bandpass signals, quadrature demodulation & time-delay estimation

Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Software radio			3.0					
Amplitude modulation			3.0					
Coherent demodulation			3.0					
Frequency modulation			3.0					
Correlation and timing recovery			3.0					
Pulse shaping			3.0					
Phase shift keying			3.0					

Grades

Aspect	Percent
Laboratory reports	75%
Laboratory demonstrations	15%
Participation	10%

Representative Textbooks and Other Course Materials

Title	Author
<i>Wireless Communications (online)</i>	Robert Heath, Jr.
<i>Instructor Notes (online)</i>	L. Potter

ABET-EAC Criterion 3 Outcomes

Course Contribution		College Outcome
***	a	An ability to apply knowledge of mathematics, science, and engineering.
***	b	An ability to design and conduct experiments, as well as to analyze and interpret data.
***	c	An ability to design a system, component, or process to meet desired needs.
	d	An ability to function on multi-disciplinary teams.
**	e	An ability to identify, formulate, and solve engineering problems.
	f	An understanding of professional and ethical responsibility.
**	g	An ability to communicate effectively.

Course Contribution		College Outcome
	h	The broad education necessary to understand the impact of engineering solutions in a global and societal context.
	i	A recognition of the need for, and an ability to engage in life-long learning.
*	j	A knowledge of contemporary issues.
***	k	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Additional Notes or Comments

Change from course number 4007.

Prepared by: Philip Schniter