

# ECE 5194.01 (Proposed): An Introduction to Radar Systems

## Course Description

This course introduces the fundamentals of radar. I.e. the main concepts and techniques used in modern radar systems. The class is a survey course exposing students to a wide range of radar applications and design issues.

**Prior Course Number:** 714

**Transcript Abbreviation:** Intro Radar System

**Grading Plan:** Letter Grade

**Course Deliveries:** Classroom

**Course Levels:** Undergrad, Graduate

**Student Ranks:** Senior, Masters, Doctoral

**Course Offerings:** Spring

**Flex Scheduled Course:** Never

**Course Frequency:** Every Year

**Course Length:** 14 Week

**Credits:** 3.0

**Repeatable:** No

**Time Distribution:** 3.0 hr Lec

**Expected out-of-class hours per week:** 6.0

**Graded Component:** Lecture

**Credit by Examination:** No

**Admission Condition:** No

**Off Campus:** Never

**Campus Locations:** Columbus

**Prerequisites and Co-requisites:** Prereq: 2100 (351), or 291 or 2104 or 2100.01 or 2100.04 or 294 (Spring 2011); and 3010 (312) or 3010.01, and STAT 3470 (427), or Grad standing in Engineering

**Exclusions:** Not open to students with credit for 714.

**Cross-Listings:**

**Course Rationale:** Existing course.

**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
EE	Electrical Engineering

## Course Goals

Become familiar with and to understand the key concepts underpinning modern radar design.
Understand basic radar concepts, the radar equation and its application
Understand the operation and trade-offs of modern radar systems.
Understand how high resolution is generated in radar, radar imaging (SAR and ISAR), Bistatic radar and electronic scanning

## Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
History and background of Radar	3.0							
The radar equation, detection and clutter	3.0							
MTI and pulse Doppler radar	2.0							
Pulse compression and waveform design	2.0		3.0					
CW and FM radar	2.0							
Tracking radar	2.0							
Radar antennas and arrays	3.0							
SAR	4.0							
Bistatic radar	3.0							
Emerging trends	2.0							
Reviews	3.0							
Civil aviation radar	2.0							
Transmitter, receivers and displays	3.0							
High resolution and target classification	3.0							

## Representative Assignments

Write a description of any radar system of choice explaining its essential design parameters and method of operation.
Write a program (Matlab) to compute the output of a pulse compression filter for the following two cases; (i) for a single point target and (ii) for two point targets showing (a) when they are unresolvable and (b) where they are resolved.

## Grades

Aspect	Percent
Homeworks	25%
Projects	25%
Mid term exam	15%
Final exam	35%

## Representative Textbooks and Other Course Materials

Title	Author
<i>Principles of Modern Radar: Basic Principles</i>	Richards, M.A. et al

## 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.

Course Contribution		College Outcome
*	g	An ability to communicate effectively.
	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

added 291 and related courses to prereqs.

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