



The  
University  
Of  
Sheffield.

Electronic &  
Electrical  
Engineering.

## EEE334 ANTENNAS, RADAR AND NAVIGATION

Credits: 10

### Course Description including Aims

This course is about understanding the fundamentals of antennas and radar systems, it will also provide a basic introduction to airborne navigation and landing systems.

The basic properties and characteristics of some of the most commonly used antenna systems will be examined. The emphasis will be on practical design and the applications of antennas. The radar part of the course will introduce the basic concepts of radar and examine various types of commercial and military radar systems in common use. Throughout the course emphasis will be placed on 'first-order' analysis techniques in order to reduce the use of advanced mathematics.

An engineer completing this course should feel at least acquainted with most types of antennas and radar system and will be able to do rough and ready performance calculations.

### Outline Syllabus

Basic properties of antennas, dipole antennas, basic loop antennas, aperture antennas, array antennas, introduction to radar systems, radar range equation, designing a radar system, radar surveillance, tracking radar, Doppler radar, radar detection theory, radar cross section, stealth, counter measures, bistatic radar, introduction to navigation systems.

### Time Allocation

24 lectures

### Recommended Previous Courses

EEE220 "Electric and Magnetic Fields" EEE206 "Communication Systems"

### Assessment

2 hour examination, answer 3 questions out of 4

### Recommended Books

Kingsley S & Quegan S	<i>Understanding Radar Systems</i>	Scitech
Balanis C.A.	<i>Antenna Theory : Analysis and Design, 2<sup>nd</sup> ed</i>	Wiley

## **Objectives**

By the end of the module successful students will be able to

1. Demonstrate an awareness of various types of antenna and their application
2. Calculate basic antenna parameters such as gain and radiation pattern for simple antenna topologies
3. Use the radar equation to calculate system parameters such as range resolution and unambiguous range for various radar systems
4. Demonstrate an awareness of various types of radar including continuous wave and pulsed Doppler systems
5. Demonstrate an awareness of the principles of stealth and basic forms of electronic counter measures
6. Demonstrate an awareness of the basic operation of GPS.