



UNIVERSITY OF NAIROBI
DEPARTMENT OF PHYSICS
BACHELOR OF SCIENCE IN MICROPROCESSOR
AND INSTRUMENTATION TECHNOLOGY

2014/2015 ACADEMIC YEAR

SPH 431 – *Antenna Theory and Propagation of Radio
Waves*

4th YEAR COURSE

Instructor: Mr. Robinson Ndegwa
Instructor Information
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URL:

Syllabus

Maxwell's equations; Electromagnetic fields and theory of radiation; Poynting vector and flow of power; Guided waves and waveguides; Retarded magnetic vector potential; Radiation of a dipole; Antenna fundamentals; Characteristics and parameters of antennas: directivity, gain, effective area, radiation impedance; Dipole antenna; Travelling-wave antenna; Linear antenna arrays; Multiplication of patterns; Thin linear antenna; Cylindrical, biconical, loop, helical, slot, micro strip, horn, reflector and dielectric antenna; Wide-band antennas; Antenna synthesis; Antenna practice: Antennas at low, medium and high frequencies; VHF and UHF antennas; TV transmitting and receiving antennas; Radar and microwaves communication antennas; Aircraft antennas; Antenna measurements

Topics	Outline	Contact Hours	Dates
Maxwell's Equations and Electromagnetic Waves	❖ Lesson 1: Maxwell's equations	1hr	15 th Jan 2015
	❖ Lesson 2: Electromagnetic fields and theory of radiation	2 hrs	20 th Jan 2015
	❖ Lesson 3: Poynting vector and flow of power	1hr	22 nd Jan 2015
	❖ Lesson 4: Guided waves and waveguides	2 hrs	27 th Jan 2015
	❖ Lesson 5: Retarded magnetic vector potential	1hr	29 th Jan 2015
	Tutorial 1	2 hrs	3 rd Feb 2015
Fundamentals of antennas	❖ Lesson 6: Characteristics and parameters of antennas: directivity, gain, effective area, radiation impedance;	1hr	5 th Feb. 2015
Types of Antenna	❖ Lesson 7: Dipole antenna; Travelling-wave antenna; Linear antenna arrays; Multiplication of patterns; Thin linear antenna; Cylindrical, biconical, loop, helical, slot, micro strip, horn, reflector and dielectric antenna; Wide-band antennas	2hrs	10 th Feb 2015

	CAT	1hr	12th Feb 2015
Antenna practice in Communications systems	❖ Lesson 8: Antenna synthesis; Antenna practice: Antennas at low, medium and high frequencies; VHF and UHF antennas; TV transmitting and receiving antennas; Radar and microwaves communication antennas; Aircraft antennas; Antenna measurements	2 hrs	17 th Feb 2015
	Tutorial 2	1 hr	24 th Mar 2015

Note: All classes will be held in **Room R133** On **Tue: 5-7pm** and **Thur. 9-10am**

1. Textbook and References

- ❖ **Antenna Theory and Design** By Warren L. Stutzman, Gary A. Thiele **3rd Edition**
- ❖ **S._J._Orfanidis Electromagnetic_Waves__Antennas**
<http://www.ece.rutgers.edu/~orfanidi/ewa/>
- ❖

1. Grading Rule

Evaluations will be based on two continuous assessment tests (CAT), three tutorials, homework assignment, the class project, and a final exam. The tables below provide the weight distribution of each category with details on the project evaluation, and the scale for final grade assignment.

Grading Categories		Grade Scale	
Categories	Grading	Points	Grade
CAT 1	10	0-39	E
CAT 2	10	40-49	D
TUTORIALS	10	50-59	C
EXAM	70	60-69	B
PTOTAL	100	70-100	A