

Liverpool John Moores University

Title: RF AND MICROWAVE ENGINEERING SYSTEMS
Status: Definitive
Code: **7012ENG** (105387)
Version Start Date: 01-08-2016

Owning School/Faculty: Electronics and Electrical Engineering
Teaching School/Faculty: Electronics and Electrical Engineering

Team	Leader
Christopher Wood	Y

Academic Level: FHEQ7 **Credit Value:** 20 **Total Delivered Hours:** 26
Total Learning Hours: 200 **Private Study:** 174

Delivery Options

Course typically offered: Semester 1

Component	Contact Hours
Lecture	20
Practical	4

Grading Basis: 50 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS1	Examination	70	2
Report	AS2	practical assignment	30	

Aims

To understand the electromagnetic spectrum in relation to RF and microwave frequencies, and how wavelengths determine propagation issues.
To know about free-wave and guided-wave propagation.
To have a knowledge of RF and microwave devices that produce those signals.
To know how RF and microwave signals can be modulated.

Learning Outcomes

After completing the module the student should be able to:

- 1 have an advanced understanding: of the electromagnetic spectrum; the relative energy content of different wavebands and of how electromagnetic signals propagate.
- 2 understand the various ways in which RF and microwave signals propagate in the earth's atmosphere as a free-wave and to understand the techniques for guided propagation, such as transmission lines, waveguides and microstrips.
- 3 have extensive knowledge of devices and circuits used to produce RF and microwave signals: Hartley and Colpitts oscillators (RF); tunnel and IMPATT diode oscillators (Microwaves).
- 4 know how RF and microwave signals can be modulated

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

Examination	1	2	3	4
Theoretical assignment	2	3		

Outline Syllabus

Wave nature of light, photon generation, electromagnetic spectrum.

Maxwell's equations of propagation.

Sky wave, ground wave and space wave propagation, simple antennas.

Guided propagation: transmission lines, waveguides, microstrips. The various modes associated with each of these.

RF and microwave oscillators.

Modulation techniques.

Degradation of signal: attenuation, absorption and dispersion.

Learning Activities

Lectures supported by handouts and numerical examples

Notes

This level 7 module aims to provide the student with an extensive knowledge of concepts in the fundamentals of RF and microwave communications.