

# Radio and Optical Signal Propagation

## Module Information

2022.01, Approved

### Summary Information

Module Code	7346ELEM
Formal Module Title	Radio and Optical Signal Propagation
Owning School	Engineering
Career	Postgraduate Taught
Credits	10
Academic level	FHEQ Level 7
Grading Schema	50

### Teaching Responsibility

LJMU Schools involved in Delivery
Engineering

### Learning Methods

Learning Method Type	Hours
Lecture	22
Practical	12
Tutorial	11

### Module Offering(s)

Display Name	Location	Start Month	Duration Number Duration Unit
JAN-CTY	CTY	January	12 Weeks

### Aims and Outcomes

Aims	To introduce the use of the electromagnetic spectrum in telecommunications systems, the choices available and consequences for system design
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**After completing the module the student should be able to:**

**Learning Outcomes**

Code	Number	Description
MLO1	1	Critically analyse the advantages and disadvantages of different parts of the electromagnetic spectrum for a particular application and future developments in maximizing available bandwidth
MLO2	2	Design a high level transmission system to meet a particular need
MLO3	3	Critically evaluate possible technical solutions to noise and attenuation issues

**Module Content**

Outline Syllabus	The electromagnetic spectrum and wave propagation principles, Considerations of band choice (E.g. RF, Optical, Microwave) for:- guided signals (e.g. copper twisted pair) - wave guides (e.g. single mode/multimode optical fibre)- free space propagation (e.g. LoS (ground-waves, space-waves), NLoS (tropospheric refraction, sky-waves, laser systems).- Noise sources, multi-user issues, signal degradation, consequences and mitigation, attenuation and power budgeting- Transmitter/receiver design (e.g. antennas)- Access to em spectrum/marketsModern and future approaches to maximizing availability, e.g. cognitive radio, Terahertz waves
Module Overview	This module looks at electromagnetic waves, their use in telecommunication systems, and the design issues related to particular parts of the spectrum.
Additional Information	This module looks at electromagnetic waves, their use in Telecommunication Systems, and the design issues related to particular parts of the spectrum.

**Assessments**

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Module Learning Outcome Mapping
Report	Case study report	100	0	MLO1, MLO2, MLO3

**Module Contacts**

**Module Leader**

Contact Name	Applies to all offerings	Offerings
Jian Zhang	Yes	N/A

**Partner Module Team**

Contact Name	Applies to all offerings	Offerings
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