



Module Specification

Satellite Communications

Version: 2023-24, v3.0, 12 Jul 2023

Contents

Module Specification	1
Part 1: Information	2
Part 2: Description	2
Part 3: Teaching and learning methods	3
Part 4: Assessment.....	4
Part 5: Contributes towards	6

Part 1: Information

Module title: Satellite Communications

Module code: UFMFLN-15-3

Level: Level 6

For implementation from: 2023-24

UWE credit rating: 15

ECTS credit rating: 7.5

Faculty: Faculty of Environment & Technology

Department: FET Dept of Engineering Design & Mathematics

Partner institutions: None

Field: Engineering, Design and Mathematics

Module type: Module

Pre-requisites: Mathematics for Signals and Control 2023-24

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: Not applicable

Features: Not applicable

Educational aims: Study of Satellite Communications provides you opportunities and poses problems, in communication methods.

The large area of access (footprint) allows a single transmission to cover an enormous number of receivers, thus allowing broadcast signals to be transmitted

simultaneously to large numbers of people. However, this feature itself creates difficulties, partly political and partly economic. National boundaries are no barrier whatsoever, the charging mechanism required to allow the satellite operators to recover the cost of development and provide continuous support requires a novel solutions.

Outline syllabus: The syllabus outline includes:

Introduction of communication satellite systems;

Constellations: Orbital Dynamics from Copernicus to Newton;

Satellite Orbital Design, Basics on Geosynchronous orbit (GEO), low-earth orbit (LEO) and Medium-earth orbit (MEO), detailed theory on Geostationary orbits, Angle from satellite to earth station;

Radio Interface: Link Budget Design from basic transmission theory to advanced link calculations;

Regulatory Issues;

Path loss including Mobile and Fixed Propagation Environment;

Fixed Earth Station Design;

Network Architectures;

Antennas;

Error coding: Types of errors;

Interference and noise: Atmospheric attenuation, attenuation, depolarisation;

Multiaccess: CDMA, FDMA, TDMA, Random Access and Speech interpolation.

Part 3: Teaching and learning methods

Teaching and learning methods: You will understand the principles of satellite communications (using lectures and tutorials) and you will be able to analyse the performance of the different orbital systems. A set of laboratories using simulation packages (Matlab) will be carried out to study the performances of satellite communication systems.

Module Learning outcomes: On successful completion of this module students will achieve the following learning outcomes.

MO1 Apply concepts of satellite communication systems associated with the operation of satellite communications networks

MO2 Demonstrate the use of advanced knowledge to solve basic and advanced radio link design problems associated with satellite communication systems

MO3 Apply skills required to design an end-to-end satellite communications link budget, based on standard engineering practices

MO4 Compare the satellite systems based on multiple access systems

MO5 Identify the commercial, economic and social context of communication engineering applications that are affected by satellite communication systems

MO6 Demonstrate the independent learning ability required for continuing professional development

Hours to be allocated: 150

Contact hours:

Independent study/self-guided study = 114 hours

Face-to-face learning = 36 hours

Total = 150

Reading list: The reading list for this module can be accessed at [readinglists.uwe.ac.uk](https://uwe.rl.talis.com/modules/ufmfln-15-3.html) via the following link <https://uwe.rl.talis.com/modules/ufmfln-15-3.html>

Part 4: Assessment

Assessment strategy: The assessment for this module is as follows:

The assessment consists of module examination and a Group Report.

The strategy has been chosen to ensure that the satellite engineering principles are assessed under controlled conditions, while a more open ended research based assignment is used to encourage wider engagement and reflection on this topic.

In the group assignment, the students will design a simple satellite communication link and will implement it by simulating using a given simulation package.

Resit is the same as the first sit

Resit deliverable(s) will be scaled appropriately to group size and task complexity

Assessment tasks:

Examination (First Sit)

Description: Examination 2 hours

Weighting: 50 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO1, MO3, MO4

Report (First Sit)

Description: Group report (max. 5000 words)

Weighting: 50 %

Final assessment: No

Group work: Yes

Learning outcomes tested: MO1, MO2, MO3, MO5, MO6

Examination (Resit)

Description: Examination 2 hours

Weighting: 50 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO1, MO3, MO4

Report (Resit)

Description: Group report (max. 5000 words)

Resit deliverable(s) will be scaled appropriately to group size and task complexity

Weighting: 50 %

Final assessment: No

Group work: Yes

Learning outcomes tested: MO1, MO2, MO3, MO5, MO6

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Electronics and Telecommunication Engineering {Foundation} [Feb][FT][GCET][4yrs]
BEng (Hons) 2020-21

Electronics and Telecommunication Engineering {Foundation} [Oct][FT][GCET][4yrs]
BEng (Hons) 2020-21