

Module Details	
Module Title	Communication Satellite Systems
Module Code	ELE7035-B
Academic Year	2022/3
Credits	20
School	Department of Biomedical and Electronics Engineering
FHEQ Level	FHEQ Level 7

Contact Hours	
Type	Hours
Lectures	22
Project Supervision	6
Seminars	6
Supervised time in studio/workshop	6
Directed Study	160

Availability	
Occurrence	Location / Period
BDA	University of Bradford / Semester 1

Module Aims
This module provides students with understanding on the principles concepts of Communication Satellite Systems and their applications, the key elements that determine their performance. It builds on satellite engineering skills to apply them to this field. Satellite communications is a major commercial application of space so that it complements the other modules of satellite engineering to give the broader picture. Students also learn to work together by dividing a project into smaller tasks.

Outline Syllabus	
- Overview of satellite orbits and constellation. - Link budgets, link availability, propagation impairments. - Communication system network architectures: meshed and star. - Communication system applications: Broadcast, VSAT, Broadband. - Payload architectures: Classical, High Throughput Satellites (HTS), Digital Payloads. - The building blocks of a payload: an overview of the equipment used. - Payload dimensioning: Air Interfaces, DC power, thermal. - System dimensioning (capacity) of an HTS system. - Frequency bands and the regulatory environment. - GEO satellite systems and NGSO satellite constellation systems.	

Learning Outcomes	
Outcome Number	Description
L01	Characterise the regulatory and technical environments that govern satellite communication systems.
L02	Critically review and evaluate the main applications of communication satellites and their impact on the system design.
L03	Master and apply the key dimensioning parameters of a communication satellite in system design.
L04	Apply system trade-offs given the requirements or application to derive a payload architecture.
L05	Quantify and analyse the potential of enabling technology in satellite systems.
L06	Demonstrate a comprehensive understanding, through the group project, on collaborative working, proposal writing, project management and the ability to present findings in a commercial context.

Learning, Teaching and Assessment Strategy

Learning and teaching will be directed, supported, and reinforced through a combination of face-to-face or online lectures and seminars, as well as through directed and self-directed study supported by learning materials available in CANVAS. Face-to-face or online drop-in sessions will be scheduled to assist students who require extra support.

The module will be delivered and assessed over four consecutive weeks, with lectures and seminars delivered within the first two weeks. Students can kick start their assessed group project from the second half of the 2nd week. Students will spend the 4th week revising for their open-book examination. Extra tutorials can be arranged upon request by students to ensure that every student understands the lecture materials.

Lectures and laboratories will be recorded live to cater for students who may not be able to attend face-to-face lectures due to extenuation circumstances. In the event of face-to-face delivery not being possible, recorded synchronous online or pre-recorded lectures and seminars will be delivered and uploaded to CANVAS to enable students watch the presentations, videos at their own time. Lectures are intended to expose the students to the applications of satellite communications and the concepts of the implementation together with the regulatory context. This will be further reinforced by lecturers from industry. Active participation is encouraged during the lectures.

There will be an open book exam to evaluate the student's ability to apply the acquired knowledge. A group project allows the students to work together on a system design project that encourages the students to apply the acquired knowledge. Such a project could a satellite design to a set of system requirements. Students will exercise project management and teamwork skills due to the limited resources (number of students) and short schedule (e.g. a week) such that students must plan (work plan structure) and share the workload (define work packages). The students will be supported in the work package breakdown to define work packages.

Students will be assessed by a group project and an open book examination. For the group project, each student must take the lead for at least one work package and contribute a minimum of 1500 word to explain the logic of the work package breakdown and to detail the work associated with their specific work package. Each student will also give a presentation of his/her work as part of the final presentation. The final report will be the compilation of the work package reports. This is intended to mimic a real-life industry project and therefore collaboration, project management are integral parts throughout the project.

Formative assessment will be through informal feedback to the technical and project management aspects of the group project work. Supplementary assessment for the group coursework if required will involve an individual submission of a minimum 1500 words report and an individual presentation of the associated work package.

Mode of Assessment

Type	Method	Description	Weighting
Summative	Coursework - Written	Project report (min. 1500 words) detailing individual contribution to group project inc. research analysis & reflection	30%
Summative	Presentation	Oral group presentation (nswers). SUPPLEMENTARY: Individual or group presentation	20%
Summative	Examination - Open Book	Open book examination (2 hours)	50%

Reading List

To access the reading list for this module, please visit <https://bradford.rl.talis.com/index.html>

Please note:

This module descriptor has been published in advance of the academic year to which it applies. Every effort has been made to ensure that the information is accurate at the time of publication, but minor changes may occur given the interval between publishing and commencement of teaching. Upon commencement of the module, students will receive a handbook with further detail about the module and any changes will be discussed and/or communicated at this point.

© University of Bradford 2022

<https://bradford.ac.uk>