MODULE DESCRIPTION FORM

DEPARTMENT OF MECHANICAL AND AEROSPACE ENGINEERING

ME955 INTRODUCTION TO SPACE TECHNOLOGIES FOR SATELLITE APPLICATIONS

Module Registrar: Dr Suki Dauda Sule suki.sule@strath.ac.uk	**Taught To (Course): MSc Satellite Applications (with Data Science)**		
Other Lecturers Involved: Astrid Werkmeister; Prof Malcolm Macdonald	**Credit Weighting: 10**	**Semester: 1**	
Assumed Prerequisites: n/a	**Compulsory class**	**Academic Level: 5**	**Suitable for Exchange: N**

Module Format and Delivery (HOURS i.e. 1 credit = 10hrs of study):

Lecture	Tutorial	Laboratory	Groupwork	External	Online	Project	Assignments	Private Study	**Total**
22	10						24	44	100

Educational Aim

This module aims to provide students with an understanding of the operation of space technologies that are used to deliver satellite data for various applications. The students will be provided with a working knowledge of how satellite systems are developed and operated as well as learn the fundamentals required to design a space mission.

Learning Outcomes

On completion of the module the student is expected to be able to:

LO1 Acquire and demonstrate an advanced understanding of the drivers that influence satellite systems design as well as the operation and integration of spacecraft sub-systems.

LO2 Conceptualise and develop initial or high-level space mission designs and analyses for a broad range of satellite applications.

Syllabus

The module will teach the following:

- An overview of the space environment and astrodynamics
- Introduction to satellite configuration
- Space systems engineering overview
- An overview of spacecraft sub-systems: payload, attitude determination and orbital control, propulsion systems, power systems, structures, thermal systems, communications system and on-board data handling and processing systems
- Earth stations/Ground segment components and relationship with the space segment
- Legal and regulatory issues
- The global space economy
- Space debris, constellations and satellite decommissioning

Assessment of Learning Outcomes

Criteria

For each of the Module Learning Outcomes the following criteria will be used to make judgements on student learning:

LO1 Acquire and demonstrate an advanced understanding of the drivers that influence satellite systems design as well as the general operation and integration of spacecraft sub-systems.
C1 Correctly identify elements of the space environment and astrodynamics and their impact on satellite systems
C2 Understand spacecraft sub-systems, functions and other elements of space technologies specifically for satellite applications
C3 Undertake initial satellite mission and technical specifications analysis

LO2 Conceptualise and develop initial or high-level space mission designs and analyses for a broad range of satellite applications.
C1 Explain the elements of the space and ground segments, including legal and regulatory issues
C2 Awareness of the main spacecraft configuration elements and propulsion systems in common use
C3 Describe the elements of space mission design and satellite system launch
C4 Develop a sample space mission analysis/design for a satellite application

The standards set for each criterion per Module Learning Outcome to achieve a pass grade are indicated on the assessment sheet for all assessment.

Principles of Assessment and Feedback
(within Assessment and Feedback Policy at: https://www.strath.ac.uk/staff/policies/academic/)

Please state briefly how these are incorporated in this module.

Assessment of student performance within the module will be based on a combination of written coursework assessment and written examination. The coursework? assessment will be used to gauge the student's general understanding of the fundamentals of spacecraft design and configuration, the sub-systems of a satellite and other taught elements of space technologies for satellite applications. The examination will primarily assess the student's in-depth understanding of the operation of a satellite and functions of each satellite sub-system, and the ability to apply the principles of space mission design and spacecraft configuration to develop high level requirements for satellite applications missions.

Multiple feedback mechanisms will be employed. Any written assessments will be returned to students with comments on performance. Additionally, clear guidance will be provided in class as to what constitutes an acceptable level of performance in written or online assessments. A class discussion and tutorial class will be used to provide further feedback on written assessments to the students in general and individually.

Assessment Method(s) Including Percentage Breakdown and Duration of Exams

Examination				**Coursework**		**Practical**		**Project**	
Number	Month(s)	Duration	***Weighting***	Number	***Weighting***	Number	***Weighting***	Number	***Weighting***
1	Dec	2 hours	60%	1	40%				
* LO1, LO2				* LO1		*		*	

* ***L/Os:*** *Indicate which Learning Outcomes (L01, L02, etc) are to be assessed by exam/coursework/practical/project as required.*

Coursework / Submissions deadlines (*academic weeks*):
Coursework submission to Myplace week 8, Monday at 10pm

Resit Assessment Procedures:
2 hr examination in August diet

PLEASE NOTE:
Students must gain a summative mark of 50% to pass the module. Students who fail the module at the first attempt will be re-assessed during the August diet. This re-assessment will consist entirely of exam. No marks from any previous attempts will be transferred to a new resit attempt.

Recommended Reading

*****Purchase recommended **Highly recommended reading *For reference (do NOT purchase)**

** Macdonald M. (Editor), Badescu V. (Editor) (2014), The International Handbook of Space Technology, Springer, Heidelberg

Additional Student Feedback

Date	Time	Room No
By arrangement	By arrangement	JW813

Session: 2019/2020

Approved:

Course Director Signature: ***E Henderson***

Date of Last Modifications: 27/08/2019

(Updated July 2019)

MODULE TIMETABLE

Module Code:	**ME955**	**Module Title:**	**Introduction to Space Technologies for Satellite Applications**

Brief Description of Assessment:

Written coursework on satellite subsystems, configuration and mission design (40% of mark).
Module Examination (60% of mark).

Assessment Timing:-

Indicate on the table below the start/submission dates for each assignment/project and the timing of each exam/assessment using the dropdowns provided. Dropdowns can be left blank. Add extra notes below the dropdowns.

Please note: Timings can and will change, this should only be used as a guide.

Semester One	W&D Wk	WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	WK9	WK10	WK11	Exam Period
	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Course work Set	Choose an item. Choose an item.	Course work Submit	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Exam

Semester Two	C&D Wk	WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	WK9	WK10	WK11	Exam Period
	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item.