MODULE DESCRIPTION FORM

DEPARTMENT OF MECHANICAL AND AEROSPACE ENGINEERING

ME517 SPACEFLIGHT SYSTEMS

Module Registrar: Prof M Vasile massimiliano.vasile@strath.ac.uk	**Taught To (Course): Cohorts for whom class is optional and compulsory**	
Other Lecturers Involved:	**Credit Weighting:10**	**Semester 2**
Compulsory/ optional class	**Academic Level: 5**	**Suitable for Exchange: Y**

Required prerequisites

Note: It is the responsibility of ALL students to ensure that they satisfy the prerequisite knowledge for this module BEFORE adding as part of curriculum selection. If unsure, please contact the Module Registrar or discuss with your Programme/Year Adviser of Studies.

Physics:
Fundamentals of kinematics and dynamics, forces and momenta, work and energy, equations of relative motion, thermodynamics, electromagnetism, basic concepts of orbital mechanics, Newton's theory of gravitation.

Mathematics: Fundamentals of linear algebra, vectors & matrices, calculus, geometry

Numerical Methods:
Solution of linear and nonlinear equations; integration of ordinary differential equations

Programming:
Knowledge of basic programming principles:
- manipulation of scalar, vectors, and matrices variables,
- use of operators, expressions, and statements (including conditional statements),
- algorithms, structured programming logic and flow diagrams,
- computer arithmetic and errors.

Ability to construct flow charts to summarise key steps of a problem.

Ability to develop and implement effective algorithms (MATLAB is the officially supported language/environment for this module, but the assignments and coursework can be done in any programming language).

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

Lecture	Tutorial	Laboratory	Groupwork	External	Online	Project	Assignments	Private Study	**Total**
20						50		30	100

Educational Aim

This class is designed to provide an overview of spaceflight systems. An overview of the complete spacecraft lifecycle from objectives, through launch and operations is covered, along with the function and purpose of the spacecraft sub-system level components. In addition to the technical detail of spaceflight systems, the importance of ancillary skill sets is introduced such as project management. Finally, the various elements of the class will be brought together through a semester-long project to develop a feasibility study of a space mission.

Learning Outcomes

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

LO1 An understanding of the sub-system level components on-board a spacecraft.

LO2 An understanding of the methods employed in spacecraft design.

LO3 The ability to develop a feasibility study of a space mission.

Syllabus

The module will teach the following:

1) Spacecraft (sub-)system
2) Spacecraft design and trade-offs
3) Spaceflight systems lifecycle
4) Space Mission Analysis and Design

Assessment of Learning Outcomes

Criteria

LO1-LO3
A clear understanding of each learning outcome must be communicated in project. The project will follow the normal review process of a real space mission. At each review the three learning outcomes will be assessed through a comprehensive presentation of the design solutions and the level of fulfilment of the mission requirements.

The ability to develop a project following the normal review process of a real space mission.
The ability to provide a comprehensive presentation of the design solutions and the level of fulfilment of the mission requirements.

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/professionalservices/staff/policies/academic/)

Assessment is by production of the feasibility study of a complete space mission from mission objectives to commissioning and operations.

The project will be assessed through three reviews mimicking the normal review process of real space missions. At each review feedback is provided directly to individual students by the assessors. During lectures, post review, more general feedback will be provided to the whole class. Failure to attend the reviews will result in loss of marks and feedback. Self and peer-directed feedback is also encouraged.

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

Examination				**Coursework**		**Practical**		**Project**	
Number	Month(s)	Duration	***Weighting***	Number	***Weighting***	Number	***Weighting***	Number	***Weighting***
								1	Submitted in 3 parts: 25%, 25%, 50%
*				*		*		*LO1-3	

* ***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*):
Deadlines will be communicated in lectures
Submissions are exempt from Late Submission Policy due to in class review element.

Resit Assessment Procedures:
Submission of a ^^new feasibility study prior to commencement of the July/August exam diet.

^^Students must contact the module Registrar for details as soon as results confirm that a resit is required.

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 prior to the July/August diet. This re-assessment will consist entirely of a coursework. No marks from any previous attempts will be transferred to a new resit attempt.

Recommended Reading

***Purchase recommended **Highly recommended reading *For reference
** Griffin & French, "Space Vehicle Design", ISBN 978-1563475399 ** Fortescue, Peter ; Stark, John ; Swinerd, Graham Spacecraft Systems Engineering4. Wiley 2011 ** Wertz, James Richard.; Larson, Wiley J.Space mission analysis and design, 3rd ed.. Microcosm; Dordrecht ; Boston : Kluwer c1999

Additional Student Feedback
(Please specify details of when additional feedback will be provided)

Date	Time	Room No
		Check timetable webpages for details

Session: 2024/25

Approved:

Programme Lead/Director Signature: Dr A McLaren
Date of Last Modifications: 23/08/2024

(MAE template updated July 2024)

MODULE TIMETABLE

Module Code:	**ME517**	**Module Title:**	**Spaceflight Systems**

Brief Description of Assessment:

Feasibility study of a space mission. Three reviews during the course: Preliminary Design Review (PDR), up to 25 points, Mid-Term Review (MTR), up to 25 points, Consolidated Design Review (CDR), up to 50 points.

Assessment Timing

Indicated on the table below are the start/submission dates for each assignment/project and the timing of each exam/assessment.

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.	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.

Semester Two	C&D Wk	WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	WK9	WK10	WK11	Exam Period
	Choose an item. Choose an item.	Project Set	Choose an item. Choose an item.	Choose an item. Choose an item.	Project Submission PDR	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Project Submission MTR	Choose an item. Choose an item.	Choose an item. Choose an item.	Project Submission CDR	Choose an item.