MODULE DESCRIPTION FORM

DEPARTMENT OF MECHANICAL AND AEROSPACE ENGINEERING

16231 (ME207 sem1 / ME213 sem2) FLIGHT AND SPACEFLIGHT 1

Module Registrar: Dr M Fossati marco.fossati@strath.ac.uk	**Taught To (Course): Cohorts for whom class is compulsory / elective**		
Other Lecturers Involved:	**Credit Weighting: 10 (ECTS 5)**	**Semester: 1 and 2**	
Assumed Prerequisites: Heat and Flow 1 (ME101) and Engineering Mechanics (16132), or basic knowledge of fundamental principles of fluid mechanics such as conservation of mass, and thermodynamics such as ideal gas laws and the concept of thermodynamic cycles. Basic knowledge of dynamics principles, such as Newton's law, balance of forces and moments and kinematics.	**Compulsory / elective class**	**Academic Level: 2**	**Suitable for Exchange: Y**

Alternative codes and credit values for those taking only one semester:
Semester 1: ME207 Flight and Spaceflight 1 (sem1) [5 Credits]
Semester 2: ME213 Flight and Spaceflight 1 (sem2) [5 Credits]

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

Lecture	Tutorial	Laboratory	Groupwork	External	Online	Project	Assignments	Private Study	**Total**
40	10							50	100

Educational Aim

This module aims to give an introduction to aeronautical science by studying some fundamental concepts and disciplines behind the theory of flight and flying machines.

Learning Outcomes

On completion of the module the student is expected to have an introductory knowledge of:

LO1 Identifying air-vehicle types, their components and modes of operation;

LO2 Understanding the system of forces acting on a vehicle during flight and the means to change these forces;

LO3 Using fundamental concepts of aerodynamics, aerospace structures and propulsion to understand design choices.

Syllabus

The module will teach the following:

Semester 1

1. Introduction to air-vehicles, forces during flight, body and wind frames;
2. Atmospheric models: standard model and NASA GRAM;
3. Aerodynamic forces, moments, and nondimensional coefficients;
4. Slender and bluff body aerodynamics, flow separation;
5. Lift: aerofoil aerodynamics, stall, high-lift devices;
6. Drag: skin friction, form, wave;
7. Lift-induced Drag;
8. Drag polar: definition and importance.

Semester 2

9. Aerospace structures: basic structural components and elements;
10. Loads and stresses: stress-strain relation; elastic and plastic regimes;
11. Aerospace materials: metallic alloys and composites;
12. Aerospace propulsion: application of Newton's laws and generation of Thrust;
13. Propeller aerodynamics: aircraft and rotorcraft;
14. Turbojet and turbofan engines: definitions and characteristics;
15. Gas turbines, inlets, compressors, turbines, nozzles and afterburners;
16. The Drag polar: a review from a propulsion point of view.

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 Identify air-vehicle types, their components and modes of operation:

C1 Ability to recognise and identify air-vehicles components and their function;
C2 Be able to explain the atmospheric models and their use.

LO2 Understand the system of forces acting on a vehicle during flight and the means to change these forces:

C1 Understanding of the different phases of flight;
C2 Ability to explain the balance of forces during flight and their interaction in the various phase of flight.

LO3 Use fundamental concepts of aerodynamics, aerospace structures and propulsion to understand design choices:

C1 Ability to explain the genesis of aerodynamic forces and moments, the meaning and the role non dimensional numbers in relation to Lift, Drag and Moments;
C2 Understanding of the fundamental elements of aircraft structures and its ability to withstand aerodynamic loads generated during flights;
C3 Ability to explain the how thrust is generated by different propulsive systems and the main components of propellers and jet engines.

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 will be a 60 minute online examination using Myplace, with theory and applied questions.

Students will be able to assess their progress and obtain feedback by a number of online quizzes that will not be assessed. Tutorial sheets will be provided which may be discussed during tutorial sessions.

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

Examination (online)				**Coursework**		**Practical**		**Project**	
Number	Month(s)	Duration	***Weighting***	Number	***Weighting***	Number	***Weighting***	Number	***Weighting***
2	Dec & Apr/May	60mins each	100% (50% each)						
* LO1, LO2, LO3				*		*		*	

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

Coursework / Submissions deadlines:

Resit Assessment Procedures:
1.5hr examination (online time-bound quiz via Myplace) in July/August diet.

PLEASE NOTE:
Students need to gain a summative mark of 40% to pass the module. Students who fail the module at the first attempt will be re-assessed during the July/August diet. This re-assessment will consist entirely of an exam. No marks from any previous attempts will be transferred to a new resit attempt.

Recommended Reading

*****Purchase recommended **Highly recommended reading *For reference**

** "Aircraft Flight" by R H Barnard & D R Philpott, Longman, ISBN 0-582-00338-5
** J.G. Leishman, “Introduction to aerospace flight vehicles”, e-book ISBN 979-8-9852614-0-0
https://eaglepubs.erau.edu/introductiontoaerospaceflightvehicles
** “Introduction to Flight” by J. Anderson, McGraw Hill, ISBN 007-123818-2

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: 05/07/2024

(MAE template updated July 2024)

MODULE TIMETABLE

Module Code:	**16231 / ME207 / ME213**	**Module Title:**	**Flight and Spaceflight 1**

Brief Description of Assessment:

- Online 60 min examination in the December diet (16231 / ME207) with theory and applied questions
- Online 60 min examination in the April/May diet (16231 / ME213) with theory and applied questions

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 could change during unforeseen periods of disruption; 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.	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.	Exam