MNE3203: AEROSPACE PROPULSION SYSTEMS

Effective Term
Semester A 2022/23

Part I Course Overview

Course Title
Aerospace Propulsion Systems

Subject Code
MNE - Mechanical Engineering
Course Number
3203

Academic Unit
Mechanical Engineering (MNE)

College/School
College of Engineering (EG)

Course Duration
One Semester

Credit Units
3

Level
B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction
English

Medium of Assessment
English

Prerequisites
MNE2112 Thermodynamics

Precursors
Nil

Equivalent Courses
Nil

Exclusive Courses
Nil

Additional Information
#Prerequisites which are not part of the Major Requirement are waived for students admitted with Advanced Standing.

Part II Course Details

Abstract

The course offers a comprehensive insight into aircraft and aerospace propulsion technologies. The theory and practice relating to the design and development framework for propulsion systems is covered which will equip the students with the technical background to address the issues of current and future propulsion systems.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	To understand the principles of propulsion systems used in aerospace and in particular the theoretical and practical methods employed in their design and development.			x	
2	To be able to apply the principles in the basic design and development of a propulsion system for aircraft and aerospace applications.			x	
3	To understand the principal demands of propulsion systems and to evaluate and describe the current and future propulsion technologies.			x	
4	Present results, analyses and conclusions from experiments or simulations in a written report such that a technically qualified person can obtain a clear understanding of the findings.			x	

A1: Attitude
Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability
Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments
Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Teaching and Learning Activities (TLAs)

	TLAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lecture	This includes a combination of lectures and tutorial classes on propulsion technologies, group sessions on the design processes, problem definitions and potential solutions.	1, 2, 3	3 hrs/week

2	Laboratory	Students will carry out practical laboratory exercises covering a range of experimental techniques and applications. These will be reported in the form of a short and concise technical report.	3, 4	3 hrs/week for 2 weeks

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Test and Assignments	1, 2, 3	20	2-3 assignments to be submitted.
2	Laboratory Reports	3, 4	20	2 reports to be submitted

Continuous Assessment (%)

40

Examination (%)

60

Examination Duration (Hours)

3

Additional Information for ATs

For a student to pass the course, at least 30% of the maximum mark for both coursework and examination should be obtained.

Assessment Rubrics (AR)

Assessment Task

Test and Assignments

Criterion

Describe the fundamental concepts of propulsion technologies and apply them to the design and performance of a range of propulsion systems used in the aerospace industries.

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Assessment Task
Laboratory Reports

Criterion
Ability to explain the operation. methodology and performance of a propulsion system and analyse the experimental data, discuss the experimental findings with concise conclusions.

Excellent (A+, A, A-)
High

Good (B+, B, B-)
Significant

Fair (C+, C, C-)
Moderate

Marginal (D)
Basic

Failure (F)
Not even reaching marginal levels

Assessment Task
Examination

Criterion
Demonstrate an understanding of the fundamental concepts of the design and development of propulsion systems, how they function, explain the performance characteristics and show how they operate for aircraft and aerospace applications.

Excellent (A+, A, A-)
High

Good (B+, B, B-)
Significant

Fair (C+, C, C-)
Moderate

Marginal (D)
Basic

Failure (F)
Not even reaching marginal levels

Additional Information for AR
Note: For a student to pass the course, at least 30% of the maximum mark for both coursework and examination should be obtained.

Part III Other Information

Keyword Syllabus

Types of propulsion systems, Underlying thermodynamics of propulsion systems, Gas turbine technologies, Ram jets and rocket propulsion, Future propulsion technologies and electrification of propulsion.

Reading List

Compulsory Readings

	Title
1	Aerospace Propulsion Systems, T A Ward, Wiley, 2010.

Additional Readings

	Title
1	Future Propulsion Systems and Energy Sources in sustainable aviation, S Farokhi, 1st edition, Wiley.