NE 353 – AEROSPACE STRUCTURES AND SYSTEMS				
Course Code	**Course Name**		**Semester**	
NE 353	Aerospace Structures and Systems		Fall ☒ Spring ☐ Summer ☐	
Hours			**Credit**	**ECTS**
Theory	**Practice**	**Lab**	3	5
3	0	0		

Course Details	
Department	Nanotechnology Engineering
Course Language	English
Course Level	Undergraduate ☒ Graduate ☐
Mode of Delivery	Face to Face ☒ Online ☐ Hybrid ☐
Course Type	Compulsory ☐ Elective ☒
Course Objectives	This course aims to provide students with a comprehensive understanding of the unique materials used in aerospace applications, including their selection criteria, processing techniques, and performance under extreme service conditions. Emphasis is placed on the relationship between material properties, processing methods, and structural performance in aircraft and aerospace engines, preparing students to contribute to materials innovation in high-performance and weight-sensitive environments.
Course Content	This course covers the fundamentals of materials used in aerospace structures and engines, including aluminium, titanium, magnesium alloys, steels, superalloys, polymers, and composites. It explores strengthening mechanisms of metal alloys, production and processing methods, mechanical and durability testing, and composite manufacturing techniques. Emphasis is placed on material requirements specific to aerospace applications, integrating real-world case studies and current industry practices.
Course Method/ Techniques	Lecture ☒ Question & Answer ☐ Presentation ☒ Discussion ☐
Prerequisites/ Corequisites	
Work Placement(s)	

Textbook/References/Materials

- Mouritz, A. P. (2012). *Introduction to Aerospace Materials*. Woodhead Publishing Limited.
- Callister Jr, W. D., & Rethwisch, D. G. (2020). *Materials Science and Engineering*. John Wiley & Sons.

Course Category				
Mathematics and Basic Sciences	☐		Education	☐
Engineering	☒		Science	☒
Engineering Design	☐		Health	☐
Social Sciences	☐		Profession	☒

Weekly Schedule

No	Topics	Materials/Notes
1	Introduction to aerospace materials	Lecture Slides
2	Materials and material requirements for aerospace structures and engines	Lecture Slides
3	Strengthening of metal alloys	Lecture Slides
4	Mechanical and durability testing of aerospace materials	Lecture Slides
5	Production and casting of aerospace metals	Lecture Slides
6	Processing and machining of aerospace metals	Lecture Slides
7	Aluminium alloys for aircraft structures	Lecture Slides
8	**Midterm Exam**	
9	Titanium alloys for aerospace structures and engines	Lecture Slides
10	Magnesium alloys for aerospace structures	Lecture Slides
11	Steels for aircraft structures	Lecture Slides
12	Superalloys for gas turbine engine	Lecture Slides
13	Polymers for aerospace structures	Lecture Slides
14	Manufacturing of fibre–polymer composites for aerospace structers and engines	Lecture Slides
15	Review	
16	**Final Exam**	

Assessment Methods and Criteria		
In-term studies	**Quantity**	**Percentage**
Attendance	14	10%
Lab		
Practice		
Fieldwork		
Course-specific internship		
Quiz/Studio/Criticize		
Homework		
Presentation / Seminar		
Project		
Report		
Seminar		
Midterm Exam	1	40%
Final Exam	1	50%
	Total	**100%**
Contribution of Midterm Studies to Success Grade		50%
Contribution of End of Semester Studies to Success Grade		50%
	Total	**100%**

ECTS Allocated Based on Student Workload			
Activities	**Quantity**	**Duration (Hrs)**	**Total Workload**
Course Hours	14	3	42
Lab			
Practice			
Fieldwork			
Course-specific Work Placement			
Out-of-class study time	14	3	42
Quiz/Studio/Criticize			
Homework			
Presentation / Seminar			
Project			
Report			
Midterm Exam and Preparation for Midterm	1	20	20
Final Exam and Preparation for Final Exam	1	21	21
Total Workload			**125**
Total Workload / 25			**125/5**
ECTS Credit			**5**

Course Learning Outcomes	
No	**Outcome**
L1	Identify and classify materials commonly used in aerospace applications and explain their unique properties.
L2	Analyze material requirements for various aerospace structures and engines, considering factors such as performance, durability, and weight.
L3	Explain the methods for strengthening metal alloys and their significance in aerospace applications.
L4	Describe the production, casting, and processing techniques for aerospace metals and evaluate their influence on material properties.
L5	Compare and contrast the properties and applications of aluminum, titanium, magnesium alloys, and steels in aerospace structures.

Contribution of Course Learning Outcomes to Program Competencies/Outcomes

Contribution Level: 1: Very Slight, 2: Slight, 3: Moderate, 4: Significant, 5: Very Significant

	P1	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**	**P9**	**P10**	**P11**	**Total**
L1	5	4	3	3	2	2	2	3	3	2	4	
L2	5	5	4	4	3	2	2	3	2	2	4	
L3	5	4	3	4	5	2	2	3	2	2	4	
L4	5	4	4	3	3	2	2	3	2	2	5	
L5	5	4	4	4	3	2	2	3	3	2	5	
											Total	