Jordan University of Science and Technology

Faculty of Engineering

Aeronautical Engineering Department

AE537 Composite Materials - JNQF Level: 7
Second Semester 2023-2024

Course Catalog
3 Credit Hours. 3 Credit hours (3 h lectures). Application of composite materials in aerospace industry, Fiber reinforced composites, Stress, strain, and strength of composite laminate, Failure criterion, Environmental effect, Design of composite structure.
Teaching Method: On Campus

Text Book	
Title	Mechanics of composite materials
Author(s)	Autar K. Kaw
Edition	2nd Edition
Short Name	Ref #1
Other Information	

Course References

Short name	Book name	Author(s)	Edition	Other Information
Ref #2	Advanced Composites	Cindy Foreman	1st Edition	
Ref #3	Mechanics of Materials	F.P. Beer, E.R. Johnston, Jr., and J.T. DeWolf	6th Edition	
Ref #4	ASTM Handbook Volume 21- Composites	Editor: D.B. Miracle and S.L. Donaldson	1st Edition	
Ref #5	Manufacturing Technology for Aerospace Structural Materials	Flake C Campbell Jr	1st Edition	
Ref #6	Lightweight Materials: Understanding the Basics	Flake Campbell	1st Edition	

Ref #7	Manufacturing Processes for Advanced Composites	Flake C Campbell Jr	1st Edition	
Ref #8	Class Handouts	Handout	1st Edition	

Instructor	
Name	**Dr. ABDALLAH ALMOMANI**
Office Location	N1- L2
Office Hours	Sun : 11:30 - 13:00 Mon : 08:30 - 10:00 Tue : 11:30 - 13:00 Thu : 11:30 - 13:00
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Class Schedule & Room
Section 2: Lecture Time: Sun, Tue, Thu : 08:30 - 09:30 Room: C5021

Prerequisites		
Line Number	**Course Name**	**Prerequisite Type**
713320	AE332 Aircraft Structural Materials	Prerequisite / Study

Tentative List of Topics Covered		
Weeks	**Topic**	**References**
Week 1	Introduction to composite materials and applications	**Chapter 1** From **Ref #1**
Week 2	Composite materials types and classifications	**Chapter 1** From **Ref #1**
Week 3	A review of stress and strain and Hooks law for isotropic materials	**Chapter 2** From **Ref #1**
Weeks 4, 5	Sandwich panels design, analysis and applications.	From **Ref #8**
Weeks 6, 7, 8	Micromechanical Analysis of a unidirectional Lamina	**Chapter 3** From **Ref #1**
Weeks 9, 10, 11	Macromechanical Analysis of Laminates	**Chapter 4** From **Ref #1**
Weeks 12, 13	Failure, Analysis, and Design of Laminates	**Chapter 2, Chapter 5** From **Ref #1**
Week 14	Hygrothermal Stresses and Strains in a Lamina	**Chapter 2** From **Ref #1**
Weeks 15, 16	Bending of composite Beams	**Chapter 6** From **Ref #1**

Mapping of Course Outcomes to Program Outcomes and NQF Outcomes	Course Outcome Weight (Out of 100%)	Assessment method
Introduce composite materials, categorizing their types and applications, providing foundational knowledge for further exploration. [1SO1] [1L7K1]	10%	
Recall key concepts related to stress and strain, demonstrating a foundational understanding of 3D Hook's law for isotropic materials. [1SO1] [1L7K1]	10%	
Design, optimize, and analyze sandwich panels, showcasing comprehension of their structural applications. [1SO2] [1L7S2]	10%	
Apply lamina analysis techniques to assess the mechanical behavior of composite materials, highlighting practical applications. [1SO2] [1L7S2]	20%	
Apply lamination theory and explore failure mechanisms and theories in laminated composite structures, fostering a deeper understanding of material durability. [1SO4] [1L7C2]	40%	
Evaluate the impact of hygrothermal effects on composites, emphasizing the importance of environmental factors in material performance. [1SO7] [1L7C4]	10%	

Relationship to Program Student Outcomes (Out of 100%)						
SO1	SO2	SO3	SO4	SO5	SO6	SO7
20	30		40			10

Relationship to NQF Outcomes (Out of 100%)			
L7K1	L7S2	L7C2	L7C4
20	30	40	10

Evaluation	
Assessment Tool	**Weight**
Exam 1	25%
Exam 2	25%
Final Project	10%
Final Exam	40%

Policy	
Attendance	The student is required to attend all the registered courses. The instructor shall register student attendance or absence electronically. JUST policy requires the faculty member to assign ZERO grade (35) if a student misses 20% of the classes. If you miss a class, it is your responsibility to find out about any announcements or assignments you may have missed.

Exam/Homework	Makeup exam should not be given unless there is a valid excuse according to JUST policies. Arrangements to take an exam at a time other than the one scheduled MUST be made prior to the scheduled exam time. Cheating or copying from neighbor on exam, quiz, or homework is an illegal and unethical activity. Standard JUST policy will be applied. All assignments must be your own work (your own words) Students are responsible for all information provided in lecture. Information presented in class supersedes any information posted elsewhere.

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