



BENHA UNIVERSITY



FACULTY OF ENGINEERING AT SHOUBRA

COURSE SPECIFICATIONS (2014-2015)

Model No.12

Course Specifications: Design & Analysis of Composite Structure

University: Benha University

Faculty: Faculty of Engineering at Shoubra

Department offering the program: Mechanical Engineering Department

Department offering the course: Mechanical Engineering Department

1- Course Data

Course Code: MDP446

Course Title: Design & Analysis of composite Structure

Specialization: Mechanical Production Engineering

Course Type: Elective

Study Year: Fourth Year

Teaching Hours: Lecture: 3 Tutorial: 2

Practical: 0

Total: 5

2- Course Aim

For students undertaking this course, the aims are to:

- 1- Understand what a laminate code is and how to use it.
- 2- Be able to incorporate failure theories in the laminate code.
- 3- Learn how to divide structures into simple plates and shells and use laminate analysis to perform initial laminate designs taking into account tensile, compressive and shear loads.
- 4- Through a class project, be able to perform an initial design optimization based on weight, cost, strength and other pertinent environmental factors

3- Intended Learning Outcomes of Course (ILO's)

a. Knowledge and Understanding Skills: On completing this course, students will be able to:

- a.1) Characteristics of engineering materials related to composite structures. (A.3)
- a.2) Methodologies of solving engineering problems of Anisotropic elasticity, data collection interpretation (A.5).
- a.3) Engineering design principles and techniques of manufacturing of composite materials (A.19)
- a.4) Current engineering technologies as related to Composite fabrication techniques. (A.8)

b. Intellectual Skills: At the end of this course, the students will be able to:

- b.1) Select appropriate solutions for engineering problems based on analytical thinking. (B.2)
- b.2) Evaluate and appraise designs, processes and products, and propose improvements for Sandwich plate (B.15)
- b.3) Select appropriate manufacturing method considering design requirements for Plate buckling equations.(B.18)

c. Practical and Professional Skills: On completing this course, the students are expected to be able to:

- c.1) Apply knowledge of mathematics, science, information technology, design, business context and engineering practice to solve engineering problems. (C.1)
- c.2) Professionally merge the engineering knowledge, understanding, and feedback to improve design of Sandwich plate. (C.2)
- c.3) Apply numerical modeling methods to Laminate analysis. (C.7)



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d. General and Transferable Skills: At the end of this course, the students will be able to:

- d.1) Effectively manage tasks, time, and resources. (D.6)
- d.2) Search for information and engage in life-long self-learning. (D.7)
- d.3) Refer to relevant literatures. (D.8)

4- Course Contents

Week no.	Topics
1	Composite fabrication techniques
2	Composite fabrication techniques
3	Fiber and particles reinforced composites
4	Selection of matrices and reinforcing materials
5	Stress analysis for isostrain and isostress conditions
6	Laminate analysis
7	Failure criteria
9	Failure criteria
10	Plate buckling equations
11	Composite structure
12	Composite structure
13	Composite design applications -1
14	Composite design applications -2

5- Teaching and Learning Methods

- 5.1 Lectures
- 5.2 Class activity
- 5.3 Assignments/ Homework

6- Teaching and Learning Methods of Disables

5-Nothing.

7- Student Assessment

a- Student Assessment Methods

- 1. Six assignments to assess knowledge and intellectual skills.
- 2. Two quizzes to assess knowledge, intellectual and professional skills.
- 3. Midterm exam to assess knowledge, intellectual, professional and general skills.
- 4. Final exam to assess knowledge, intellectual, professional and general skills.

b- Assessment Schedule

NO.	Assessment	Week
1	Assignments	2, 4, 5, 7, 11, 12
2	Quiz	4, 10
3	Midterm exam	8
4	Final exam	15

c- Weighting of Assessments

Assessment	Weight (%)
Midterm Examination	20
Final Term Examination	64
Oral Examination	00
Semester Work	16
Other Types of Assessment	00
Total	100



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8- List of References

a- Course Notes: Course notes prepared by instructor.

b- Recommended Books

1. Laszlo P. Kollar and George S. Springer, "Mechanics of Composite Structures", Cambridge University Press, 2003.
2. Arthur P. Boresi and Richard J. Schmidt, "Advanced Mechanics of Materials", 6th Edition, John Wiley and Sons, 2003.

Course Coordinator: Dr. Tarek Ahmed Fouad Khalifa

Head of Department: Prof. Dr. Osama Ezzat Abdelatif



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FACULTY OF ENGINEERING AT SHOUBRA

COURSE SPECIFICATIONS (2014-2015)

Model No.11A

Course Specifications: Design & Analysis of composite Structure

University: Benha University

Faculty: Faculty of Engineering at Shoubra

Department offering the program: Mechanical Engineering Department

Department offering the course: Mechanical Engineering Department

Matrix of Knowledge and Skills of the Course

No.	Topics	week	Basic Knowledge	Intellectual Skills	Professional Skills	General Skills
1	Composite fabrication techniques	1	a.1	b.1		d.1
2	Composite fabrication techniques	2	a.1	b.1	c.2	
3	Fiber and particles reinforced composites	3	a.2	b.1	c.2	
4	Selection of matrices and reinforcing materials	4	a.2	b.1		d.1
5	Stress analysis for isostrain and isostress conditions	5	a.2	b.2	c.3	d.2
6	Laminate analysis	6	a.3	b.2	c.3	
7	Failure criteria	7	a.3	b.1	c.1	
8	Failure criteria	8				
9	Plate buckling equations	9	a.1	b.1		d.3
10	Composite structure	10	a.2, a.4	b.3	c.2	
11	Composite structure	11	a.2, a.4	b.2	c.2	
12	Composite design applications -1	12	a.3 , a.4	b.2		d.2
13	Composite design applications -2	13	a.2	b.3		d.2
14	Composite fabrication techniques	14	a.1	b.3		d.3
15	Final exam	15	a.3 , a.4	b.2	c.2	

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COURSE SPECIFICATIONS (2014-2015)

Matrix of course aims and ILO's

Course Title: Design and Analysis of composite structures **Code:** MDP446

Lecture: 3 **Tutorial/Practical:** 2 **Total:** 5

Program on which the course is given: B.Sc. Mechanical Production Engineering

Major or minor element of program: Minor.

Department offering the program: Mechanical Engineering Department

Department offering the course: Mechanical Engineering Department

Academic year / level: **Fourth Year / Second semester**

Date of specifications approval: 2014

Course aims	Basic Knowledge	Intellectual Skills	professional Skills	General Skills
Understand what a laminate code is and how to use it.	a.1 ,a.2	b.1,b.2	c.1,c.2	d.1
Be able to incorporate failure theories in the laminate code.	a.1 ,a.2	b.2,b.3	c.1,c.2,c.3	d.1d.3
Learn how to divide structures into simple plates and shells and use laminate analysis to perform initial laminate designs taking into account tensile, compressive and shear loads.	a.1 ,a.3	b.2,b.3	c.1,c.2	d.2,d.3
Through a class project, be able to perform an initial design optimization based on weight, cost, strength and other pertinent environmental factors	a.3 ,a.4	b.1,b.2,b.3	c.1c.3	d.1d.3

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