Course Specifications: Stress analysisPDE281

1. Basic Information

Program Tile	Biomedical Engineering
Department offering the Program	Biomedical Engineering
Department Responsible for the Course	Production Engineering & Mechanical Design
Course Title	Stress analysis
Course Code	PDE281
Year/ Level	Level 200
Credit Hours	3
Specialization	Major
Requirements	PDE181
Authorization data of course specification	

Teaching Hours	Credit	Lectures	Tutorial	Practical
	3	2	2	-

2. Course Aims:

No.	Aims
1	Apply knowledge of physics to be able to make distributed Stress analysis.
4	Use the finite element method of stress analysis in the frame design of biomedical systems

3. Intended Learning Outcomes (ILOs):

A. Knowledge and Understanding:

No.	Knowledge and Understanding
A1	Concepts and theories of mathematics and sciences, appropriate to stress analysis
A14	Apply design methods and tools for biomedical instrumentations and rehabilitation devices

B. Intellectual Skills

No.	Intellectual Skills
B6	Investigate the failure of components, biomedical systems, and processes by analyzing stresses.
B7	Solve Stress and strain engineering problems, often on the basis of limited and possibly contradicting information.
B17	Investigate the characteristics of biomedical engineering material and perform failure analysis.

C. Professional Skills

No.	Professional Skills
C1	Apply knowledge of mathematics, and engineering practice integrally to solve bending and torsion of beams problems
C13	Apply the appropriate design techniques for modeling and analyzing medical engineering materials problems

D. General Skills

No.	General Skills
D3	Communicate effectively

4. Course Contents:

No.	Topics	Weeks
1	Introduction	1-2
2	Mohr circle	3-4
3	Theory of elasticity	5-6
4	Stress and strain relation	7
5	Thermal effects	9
6	Plates and shells	10
7	Bending and torsion of beams	11
8	Idea on finite element method of stress analysis	12
9	Theories of failure and design consideration	13

5. Teaching and Learning Methods:

No.	Teaching Method
1	Lectures

2	Case Studies
3	Discussion Sessions

6 Teaching and Learning Methods for Disabled Students:

No.	Teaching Method	Reason
1	Extra discussion sessions	To listen to their questions and answer it

7. Student Evaluation:

7.1 Student Evaluation Methods:

No.	Evaluation Method	ILOs
1	Mid Term Examination	A1,B6, B7
2	Semester work	A14, B7,B17, C1, C13, D3
3	Final Term Examination	A1, B17, B7

7.2 Evaluation Schedule:

No.	Evaluation Method	Weeks
1	Mid Term Examination	8
2	Semester work	Every week
3	Final Term Examination	15

7.3 Weighting of Evaluations:

No.	Evaluation Method	Weights
1	Mid Term Examination	15%
2	Semester work	35%
3	Final Term Examination	50%
Total		100%

8. List of References

No.	Reference List
1	Lecture notes.
2	Tada, Hiroshi, P. C. Paris, and G. R. Irwin. *The analysis of cracks handbook*. New York: ASME Press, 2000.
3	Donald, Bryan J. Practical stress analysis with finite elements. Dublin: Glasnevin Publishing, 2011.
4	Humphrey, Jay D., and Sherry L. Delange. An introduction to biomechanics : solids and fluids, analysis and design. New York: Springer, 2015.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	White Board
3	Data Show System
4	Sound System
5	Wireless Internet

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aims	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
1	Introduction	1	A1			
2	Mohr circle	1	A14			D3
3	Theory of elasticity	1	A1	B6, B7	C1	
4	Stress and strain relation	1	A1		C13	D3
5	Thermal effects	1,4	A1		C1	
6	Plates and shells	1,4	A1	B7		
7	Bending and torsion of	1	A1, A14	B7, B17	C13	D3
8	beams Idea on finite element method of stress analysis	1	A1, A14	B17		

9	Theories of failure and design consideration	1,4	A1, A14	B7, B17	C1, C13	D3

Course Coordinator: Prof.Dr.
Head of Department: Assoc. Prof. Hossam Eldeen Salah
Date of Approval: