Cairo University
Faculty of Engineering

Department of Aerospace Engineering

Course Specifications

Program(s) on which this course is given:	B.Sc. in Aerospace Engineering
Department offering the program:	Aerospace Department
Department offering the course:	Aerospace Department
Academic Level:	2014-2015 / 3rd year
Date	2015
Semester (based on final exam timing)	☐ Fall ☐ Spring

A- Basic Information

1. Title:	**Solid Mechanics**			**Code:**		**AER 635**		
2. Units/Credit hours per week:	Lectures	**(3)**	Tutorial	0	Practical	**included**	Total	3

B- Professional Information

1. Course description:	
2. Intended Learning Outcomes of Course (ILOs):	**a) Knowledge and Understanding**
	a1- present a *unified, mathematically rigorous* "*Lagrangian and/or Eulerian*" description to two classical branches of mechanics: the mechanics of fluids and the mechanics of solids.
	a2- Demonstrate knowledge of tensors, stress and strain relations, principle of work and energy, structure continuity and stability.
	b) Intellectual Skills
	b1- Articulate basic principles and equations applicable to all constitutive models. State capabilities and limitations of the specific constitutive models covered in this course.
	b2- Formulate problems in Lagrangian and/or Eulerian approaches.
	c) Professional and Practical Skills
	c1- Construct and use software codes.
	c2- Be able to present finding to fellow students through an oral presentation in a formal classroom setting
	d) General and Transferable Skills
	d1- The ability to analyze results and draw conclusions..
	d2- The capability to achieve work in a team.

3. Contents

Topic	**Total hours**	**Lectures hours**	**Tutorial/ Practical hours**

Vectors and tensors: Introduction to the subject, algebra of vectors and tensors (index notation, products, calculus of vectors and tensors).	1	1	1
Kinematics of deformation and motion: The Lagrangian vs. Eulerian description.	2	2	1
Stress and strain relations	2	2	1
Work and Energy : Conservation of energy principle	3	2	1
Continuity and discontinuity	2	2	1
Structure critical stability analysis	2	2	1
Spreading of waves	2	2	1
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4. Teaching and Learning Methods			
	Class Activity (1)	Case Study (1)	Projects (1)
	E-learning ( )	Assignment/Homework (1)	Other: (1)

5. Student Assessment Methods

• **Assessment Schedule**		**Week**
Assessment 1	Quiz 1	3
Assessment 2	Report 1	4
Assessment 3	Quiz 2	5
Assessment 4	Report 2	7
Assessment 5	Midterm exam	8
Assessment 6	Report 3	9
Assessment 7	Quiz 3	10
Assessment 8	Report 4	12
Assessment 9	Project	13
Assessment 10	Report 5	15
Assessment 11	Final Exam	16

- **Weighting of Assessments**

-Mid-Term Examination	15 %
-Final-term Examination	50%

-Project	10%
-Class Test	15%
-Presentation	10%
-Total	100%
6. List of References	
P. Kelly, *Solid Mechanics Part III: Foundations of Continuum Solid Mechanics.*	
M. Epstein, *The Geometrical Language of Continuum Mechanics.*	
M. Epstein, *The Elements of Continuum Biomechanics*.	
H. Yamaguchi, *Engineering Fluid Mechanics*.	
7. Facilities Required for Teaching and Learning	
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Course Coordinator:	**Prof. Dr. Amr Gamal**
Head of Department:	**Prof. Dr. Ayman Kassem**