Course Specifications

Program(s) on which this course is given:	Aerospace Engineering
Department offering the program:	**Department of Aerospace Engineering**
Department offering the course:	**Department of Aerospace Engineering**
Academic Level:	B.Sc.
Date	March 23 2015
Semester (based on final exam timing)	☐x Fall ☐ Spring

A- Basic Information

1. Title:	Plasticity			**Code:**	AER 638			
2. Units/Credit hours per week:	Lectures	27	Tutorial	15	Practical	**3**	Total	45

B- Professional Information

1. Course description:	This course is intended to introduce the basic concepts of metallic materials plasticity, plastic flow, plastic flow rate , plastic hardening, plastic constitutive model , theories of computing stress and total strain associated with plastic deformation with application to engineering structures analysis and design
2. Intended Learning Outcomes of Course (ILOs):	**a) Knowledge and Understanding**
	To know the importance of considering plasticity phenomena in structures design damage
	To understand basic differences between stress dependent, plasticity, time dependent and rate dependent plasticity.
	b) Intellectual Skills
	To learn the monolithic materials theories for calculating plastic deformation , plastic strain increment, plastic strain flow and plastic strain flow rate as function of stress, time and rate of application, plasticity constitutive relationships and models.
	To learn the theories of limit analysis and shake down theories.
	c) Professional and Practical Skills
	Application of plasticity calculations to engineering components design
	Plastic deformation effects on aerospace structures and engines performance and strength
	d) General and Transferable Skills
	Plastic deformation inspection

3. Contents

Topic	Total hours	Lectures hours	Tutorial/ Practical hours
Stress, time and rate dependent plastic damage and deformation		3	
Variation of material properties with plasticity		3	
Theories of plastic deformation, plastic flow and plastic flow rate constitutive relationships		9	9
Limit analysis and shake down theories		3	
Application of plasticity calculations to truss and frame structures.		6	6
Applying plasticity calculations to finite		3	3

element structural analysis			
4. Teaching and Learning Methods	Lectures (27)	Practical Training/ Laboratory (15)	Seminar/Workshop (3)
	Class Activity (4)	Case Study (1)	Projects (1)
	E-learning (2)	Assignments /Homework (5)	Other:

5. Student Assessment Methods	
• **Assessment Schedule**	**Week**
-Assessment 1;Class test	4,5,6
-Assessment 2; Project Assignment	7
-Assessment 3; Presentations	10
-Assessment 3; Midterm Exam	9
-Assessment 4; Final Exam	16
• **Weighting of Assessments**	
-Mid-Term Examination	20
-Final-term Examination	40
-Project	20
-Class Test	15
-Presentation	5
-Total	100

6. List of References

Plasticity: Fundamentals and General Results. , Editor: J. B. Martin, ISBN-10: 0262131145

Plasticity: Fundamentals and Applications, Editor: P.M. Dixit, U.S. Dixit, ISBN 9781466506183

7. Facilities Requueired for Teaching and Learning

Computer lab

Course Coordinator:	**Nader M. Abuelfoutouh**
Head of Department:	**Ayman H. Kassem**