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:	BSc
Date	March 23 2015
Semester (based on final exam timing)	☐x Fall ☐ Spring

A- Basic Information

1. Title:	Design for Creep and fatigue			**Code:**		AER 639		
2. Units/Credit hours per week:	Lectures	27	Tutorial	15	Practical	**3**	Total	45

B- Professional Information

1. Course description:	This course introduces the concepts of material fatigue and creep and their interaction especially at high temperature to the student. This creep-fatigue interaction dramatically controls the service life of aircraft engines. It also degrades the performance of all vibrating components in the aircraft within their service life. Creep-fatigue inspection reduces fatal accidents portability.
2. Intended Learning Outcomes of Course (ILOs):	**a) Knowledge and Understanding**
	To know the importance of understanding fatigue and creep phenomena in structures
	To understand basic techniques to predict fatigue and creep damage
	b) Intellectual Skills
	To learn the method for predicting of creep and fatigue service life.
	To learn the methods to predict the structural durability and reliability under creep and fatigue loads.
	c) Professional and Practical Skills
	Application of creep and fatigue calculations to engineering components
	Design of structures for fatigue, creep and thermo_mechanical fatigue
	d) General and Transferable Skills
	Fatigue and creep damage inspection

3. Contents

Topic	**Total hours**	**Lectures hours**	**Tutorial/ Practical hours**
Creep and fatigue damage initiation		3	
Creep and fatigue damage inspection technology		3	
Prediction of creep and fatigue damage.		9	9
Environmental degradation of fatigue and creep service life.		3	
Fatigue and creep structural design. Integrity, durability and reliability.		6	6
Improving creep and fatigue service life		3	3
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

Creep of engineering materials and structures, Editors: G.Bernas Coni, G,Piatti, ISBN: 0-85334-878-2

Lifetime prediction and constitutive modelling for creep-fatigue interaction, Editor: Domagoj Rubesa, ISBN 978-3-443-23015-9,

Low Cycle Fatigue and Elasto-Plastic Behaviour of Materials, Editors: K.-T. Rie, H. W. Grünling, G. König, P. Neumann, H. Nowack, K.-H. Schwalbe, T. Seeger
ISBN: 978-94-010-5269-6 (Print) 978-94-011-2860-5 (Online)

7. Facilities Required for Teaching and Learning

.advanced materials lab

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