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:	Finite element and finite strip method			**Code:**		AER 637		
2. Units/Credit hours per week:	Lectures	27	Tutorial	15	Practical	**3**	Total	45

B- Professional Information

1. Course description:	To introduce to the student the structural modeling using the finite element and the finite strip concept, the derivation of stiffness , mass and damping matrices in both technique and applying them to solve static and dynamic structural cases and compare the strength and weakness in each method.
2. Intended Learning Outcomes of Course (ILOs):	**a) Knowledge and Understanding**
	To know the importance of using finite element and finite strip method in solving structural static and dynamic load cases.
	To understand the representation of the structure by a set off elements or strips and representing both elements and strips by a set of generalized coordinates subjected to generalized loads using shape functions and applying Lagrange equations of motion and setting it in matrix form.
	b) Intellectual Skills
	To learn theories for deriving stiffness, mass and damping matrices for finite elements and their solution convergence properties. Stiff and soft elements.
	To learn theories for deriving stiffness, mass and damping matrices for finite strips and their solution convergence properties.
	c) Professional and Practical Skills
	Application stiffness, mass and damping matrices of finite elements to solve static structures and dynamic structure in frequency domain and in time domain.
	Application stiffness, mass and damping matrices of finite stripe to solve static structures and dynamic structure in frequency domain and in time domain
	d) General and Transferable Skills
	Comparisons between finite element and finite strip methods

3. Contents

Topic	Total hours	Lectures hours	Tutorial/ Practical hours
Finite elements versus finite strips		3	
Theory of derivation of finite elements and strip elements using Lagrange equation.		3	
Derivation of finite element mass, stiffness and damping matrices and application to engineering static and dynamic problems		6	6

Derivation of finite strip mass, stiffness and damping matrices and application to engineering static and dynamic problems		6	3
Convergence of solution in finite element and finite strip method		6	6
Weakness and strength in finite element and finite strip		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

The finite element method, Editor: O.CC. Zienkeiwicz, ISBN: 9780080531670

Finite Strip Method, Editors: V.K.Vheung, L.G. Tham, ISBN-:0-8493-7430-8

7. Facilities Required for Teaching and Learning

Computer lab

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