MCE 466 - Introduction to Finite Element Methods

Syllabus and Course Outline

Instructor:	• David G. Taggart, 289 Fascitelli, 874-5934, taggart@uri.edu
Office Hours:	• Tuesday/Thursday 12:30-1:30, by appointment, In-person or via Zoom (Zoom Personal Room)
Location / Time:	• Bliss 210, Tuesday/Thursday, 10:00 AM - Noon
Required Text:	• **A First Course in the Finite Element Method**, 5th or 6th edition, by Daryl L. Logan, Cengage, 2012 or 2017.
Software:	• **ABAQUS (Teaching Edition)** - Available on ECC lab computers or ECC Virtual Desktop (VDI) System (VDI Instructions) • **ABAQUS (Learning Edition)** - free download from 3DS Academy • **Matlab** - free to URI Students • **Document scanner** - Google Drive App, Camscanner, or similar app
Grading:	• Five Quizzes (10% each) • Computer Assignments (45%) • Attendance (5%) • Grading: A 92-100; A- 90-92; B+ 88-90; B 82-88; B- 80-82; C+ 78-80; C 72-78; C- 70-72; D+ 68-70; D 60-68; F <60
FEA Vendor Links:	• ABAQUS / SIMULIA, ANSYS, ADINA, SOLIDWORKS Simulation, MSC Apex
Course Links:	• URI Brightspace
Course Policies:	• MCE 301 and 372 are required prerequisites for this course. Students who have not taken these courses should contact me immediately. • You are expected to attend all classes, read the listed text sections and complete the assigned homework problems. • Academic integrity: According to URI's student handbook (p. 12), "A student's name on any written work including assignments, lab reports, internship reports, papers, or examinations, shall be regarded as assurance that the work is the result of the student's own thought and study." While group study is generally encouraged in this course, each student is expected to submit work that they have developed on their own. • Any student with a documented disability is welcomed to request accommodations. If you have any such requests, please contact me as soon as possible. For more information, please contact the Disability, Access and Inclusion office at 874-7400 or visit their web site at www.uri.edu/disability.
COVID Information:	• URI's mask policy states *"The University no longer requires community members to wear masks indoors, except in those spaces where direct academic instruction and research are taking place unless a faculty member waives the requirement."* Since our classroom is fairly large, I am OK with waiving the mask requirement. However, if anyone prefers that we wear masks, we will do so. Please feel free to contact me if you'd like to make such a request.

Course Outline (tentative)

Class # & Date	Resources (posted online)	In-person / Computer Activities
1 - 1/3 (Tuesday)	<u>Topics</u> • Course Introduction (<u>Powerpoint</u>) • Chapter 1 Introduction (<u>Powerpoint</u>) • Appendix A, B Math & Mechanics Review (<u>Powerpoint</u>/ <u>video</u> / <u>notes</u>) • Chapter 2 (2.1-2.6) - Spring elements (<u>Powerpoint</u> / <u>video</u> / <u>notes</u>) • Matlab Truss analysis (<u>Example 3.5 - Matlab Script</u>) • Abaqus Truss analysis (<u>Tutorial</u> / <u>video</u>) <u>Assignments</u> • <u>HW 1</u> - A.1, 7, 9, 10 and B.3 (<u>solution</u> / <u>video</u> / <u>notes</u>) • <u>HW 2</u> - 2.13, 15 and 21 (<u>solution</u> / <u>video</u> / <u>notes</u>) • <u>Computer Assignment #1</u> (Due Friday 1/6, 11:30 PM)	<u>In-class Activities</u> • Course Introduction • Introduction to Finite Elements • Abaqus Truss Analysis
2 - 1/5 (Thursday)	<u>Topics</u> • Chapter 3 (3.1-3.8, 3.10-3.11) - Truss Elements (<u>Powerpoint</u> / <u>video</u> / <u>notes</u>) • Chapter 4 (4.1-4.5) - Beam Elements (<u>Powerpoint</u> / <u>video</u> / <u>notes</u>) • Chapter 5 (5.1-5.5) (<u>Powerpoint</u> / <u>video</u> / <u>notes</u>) • Abaqus Beam analysis (<u>Tutorial</u> / <u>video</u>) <u>Assignments</u> • <u>HW 3</u> - 3.8, 15a, 18a, 23, 27, 56 and 58a (<u>solution</u> / <u>video</u> / <u>notes</u>) • <u>HW 4</u> (<u>solution</u> / <u>video</u> / <u>notes</u> / <u>hw4.m</u>) • <u>Computer Assignment #2</u> (Due Tuesday 1/10, 11:30 PM)	<u>In-class Activities</u> • HW Review • Quiz #1 - HW's 1&2 (<u>solution</u>) • Abaqus Beam Analysis
3 - 1/10 (Tuesday)	<u>Topics</u> • Chapter 6 - Plane stress analysis (<u>Powerpoint</u> / <u>video</u> / <u>notes</u>) • Chapter 7 - Practical considerations (<u>Powerpoint</u> / <u>video</u>) • Chapter 8 - LST Elements (<u>Powerpoint</u> / <u>video</u>) • Abaqus Plane Stress Analysis (<u>Tutorial</u> / <u>video</u>) <u>Assignments</u> • <u>HW 5 - 6.3c, 6.11b and 6.13</u> (<u>solution</u> / <u>video</u> / <u>notes</u> / <u>hw5.m</u>) • <u>Computer Assignment #3</u> (Due Friday 1/13, 11:30 PM / <u>video</u>)	<u>In-class Activitiess</u> • HW Review • Quiz #2 - HW 3 (<u>solution</u>) • Abaqus Plane Stress Analysis
4 - 1/14 (Thursday)	<u>Topics</u> • Chapter 9 Axisymmetric Elements (<u>Powerpoint</u> / <u>video</u>) • Chapter 10 - Isoparametric Formulation, Numerical Integration (<u>Powerpoint</u> / <u>video</u> / <u>notes</u>) • Chapter 11 - 3-D analysis (<u>Powerpoint</u> / <u>video</u>) • Abaqus 3-D analysis (<u>Tutorial</u> / <u>video</u> / <u>plate_w_hole.SAT</u>) <u>Assignments</u> • <u>HW 6</u> (<u>solution</u> / <u>video</u> / <u>notes</u> / <u>hw6_1.m</u> / <u>hw6_2.m</u>) • <u>HW 7</u> (<u>solution</u> / <u>video</u> / <u>notes</u>) • <u>Computer Assignment #4</u> (Due Tuesday 1/17, 11:30 PM / <u>video</u>)	<u>In-class Activitiess</u> • HW Review • Quiz #3 - HW 4 • Abaqus 3-D Analysis
5 - 1/17 (Tuesday)	<u>Topics</u>	<u>In-class Activities</u>

	• Additional topics ([Powerpoint](#) / [video](#))
	• Abaqus tutorials
	   ○ [Heat Transfer Examples](#) / [video](#)
	   ○ [Transient Heat Transfer](#) / [video](#)
	
	Assignments
	
	• [Computer Assignment #5](#) (Due Friday 1/20, 11:30 PM / [demo](#) / [video](#))
		• HW Review
		• Quiz #4 - HW's 5, 6 & 7
		• Abaqus Heat Transfer Analysis

6 - 1/20 (Friday)
Note: we will meet on Friday this week only.
	Topics
	
	• Abaqus tutorials
	   ○ [Column Buckling Tutorial](#) / [video](#)
	   ○ [Plate Bending Tutorial](#) / [video](#)
	• [Student evaluations](#)
		In-class Activities
		
		• Review
		• Quiz #5 - Abaqus