CE 529a Finite Element Analysis (3)

2018 Fall Semester — Course Syllabus

Lecture	Tuesday	6:40p.m. to 9:20 p.m.	OHE 122
Lab	Friday	5:30 p.m. to 6:20 p.m.	OHE 122
Professor	L. Carter Wellford		
Office	KAP 238B		
Office Hours	M, TH 11:00 AM - 12:00 PM		
Phone	(310) 968-1224 cell		
Email	wellford@usc.edu		
TA Office Hours			
Teaching Assistant I	To be announced		
Email			
Office			
Office Hours	To be announced		
Teaching Assistant II	To be announced		
Email			
Office			
Office Hours	To be announced		
Teaching Assistant III	To be announced		
Email			
Office			
Office Hours	To be announced		
Prerequisites	Graduate Standing		
Textbook	Cook, et. al., "Concepts and Applications of Finite Element Analysis", Wiley		
Course Reader	Wellford, L.C., "CE 529a Class Notes" (available as a “Class Reader” in USC Bookstore)		
Course Description	Typical engineering problems discussed on a physical basis. Setup and solution of problems by means of the existing mathematical tools		
Course Objectives	See description below		
Learning Objectives			
Policies on			
Late work	No late homework will be accepted		

CE 529a Finite Element Analysis (3)

2018 Fall Semester — Course Syllabus

Make-up work		
Incomplete work		
Extra credit		
Final grade schema is based on the following percentages of graded coursework :		
Homework	25 %	Homework assigned weekly, problems are due on the following week
Lab Homework	5 %	
Midterm	25 %	10/9/2018
Final Project	20 %	Due 12/11/2018
Final Exam	25 %	12/11/2018 — 7-9pm
Total	100 %	

Class Calendar (topic dates are subject to change)

Week	Date	Main Lecture Topics	Exams	Due Dates
1	8/21	Variational Models		
2	8/28	Calculus of Variations		
3	9/4	Constraints – Lagrange's multiplier, Penalty – Galerkin Method		
4	9/11	Continuum Elements I, Isoparametric Ele., Numerical Integration		
5	9/18	Elasticity Problems, Numerical Implementation		
6	9/25	Stress Calculation		
7	10/2	Continuum Elements II		
8	10/9		Midterm	
9	10/16	Axisymmetric Problems,		
10	10/23	Incompressible and Constrained Problems		
11	10/30	Plate Theory; Plate Elements; Kirchhoff and Mindlin Elements		
12	11/6	Shell Theory, Analysis of Shells		
13	11/13	Structural Dynamics, Time History Analysis, Free Vibration		
14	11/20	Nonlinear Structural Analysis		
15	11/27	Adaptive Methods, Elastic Stability, Buckling		
	12/11		Final Exam	Project

Variational Models
Calculus of variations
Constraints – Lagrange multiplier
Constraints – penalty
Galerkin method

CE 529a Finite Element Analysis (3)

2018 Fall Semester — Course Syllabus

Continuum Finite Elements
1-D interpolation methods
2-D interpolation methods – rectangles and triangles
3-D interpolation methods – hexahedron, tetrahedron, prism
Isoparameteric Elements
Mappings – physical system and natural coordinate system
Numerical integration – Gauss quadrature
Numerical Implementation of the Finite Element Method
Column storage schemes
Assembly in active column form
Static column solvers
Mesh generation
Finite Elements for Elasticity Problems
Plane stress – plane strain
Stress calculation
Incompressible problems
Pressure, enforced displacement, and thermal loadings
Finite Elements for Axi-symmetric Elasticity Problems
Finite Elements for Plate Problems
Finite Elements for Shell Problems
Finite Elements for Dynamic Problems
Introduction to Nonlinear Finite Element Analysis
Adaptive methods
Stability problems

STATEMENT ON ACADEMIC INTEGRITY

USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one's own academic work from misuse by others as well as to avoid using another's work as one's own.

All students are expected to understand and abide by these principles. *SCampus,* the Student Guidebook, contains the Student Conduct Code in Section 11.00, while the recommended sanctions are located in Appendix A: http://www.usc.edu/dept/publications/SCAMPUS/gov/. Students will be referred to the Office of Student Judicial Affairs and Community Standards for further review, should there be any suspicion of academic dishonesty. The Review process can be found at: http://www.usc.edu/student-affairs/SJACS/.

STATEMENT FOR STUDENTS WITH DISABILITIES

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me (or to TA) as early in the semester as possible.

DSP Contact Information

Office location: STU 301

Hours open: 8:30 a.m. until 5:00 p.m. — Monday through Friday.

Phone number: (213) 740-0776