UNIVERSITY OF SOUTHERN MAINE
Department of Engineering

New Course Announcement for the Fall of 2019

EGN 498 – Engineering Analysis Using the Finite Element Method

When: Tuesdays 4:10 to 5:25 pm; Thursdays 4:10 to 6:25 pm
Where: 233 JMC and 270 JMC as needed for the lab
Instructor: Dr. Asheesh Lanba, (207) 780-5582, asheesh.lanba@maine.edu

Course Description:

The Finite Element Method (FEM) has become an indispensable tool for engineers over the past few decades. FEM is a powerful numerical approach that allows for the solving of complex engineering problems. In short, the method breaks down a complex system into more manageable and simpler parts called elements. The equations used to model the elements are then assembled into a global system of equations that solves for the entire problem, much like using LEGO bricks to assemble complex objects. There are many commercially available FEM software, but without proper knowledge of the working of the method, engineers can often produce incorrect results or not realize a use where FEM would benefit their design and analysis.

This course will use a balance of theory and applications to lay down the fundamentals of the FEM for engineering students, and equip them with the knowledge and tools necessary to successfully utilize FEM. Fundamental concepts such as interpolation functions for 1D and 2D elements, bar elements, Galerkin method, discretization, assembling of global matrices and solving for nodal values will be discussed. Computer implementation of concepts will form part of the laboratory component of the course.

Pre-requisites: Introductory programming (EGN 160 or COS 160/170); EGN 248 Introduction to Differential Equations and Linear Algebra; MEE 251 Strength of Materials

Textbook:

Reddy, J.N. (2018), *Introduction to the Finite Element Method*, 4th Edition, McGraw Hill Education

About the Instructor:

Dr. Lanba is joining USM as an Assistant Professor of Mechanical Engineering in Fall 2019. He obtained his PhD in Engineering Science and Mechanics from the Pennsylvania State University in 2015. His research involved establishing structure-property-function relationships for NiTi-based shape memory alloys. He also taught Engineering Statics, Dynamics, Strength of Materials and Experimental Stress Analysis, and mentored undergraduate researchers. He investigated analytical means using FEM for stress intensity factor computation, developing a new crack tip element that is tolerant to severe mesh distortion.