MEEN 4140 / 5800 Finite Element Analysis Spring 2020

Instructor: Hyeonu Heo  
Office: F102G  
Email: Hyeonu.Heo@unt.edu  
Lecture Time: MW 5:30 - 6:50 pm (F175)  
Lab Time: F 1:30 - 4:20 pm (F175)  
Office Hours: MW 5:00 - 5:30 pm or by appointment

Course Description:
A numerical technique for finding approximate solutions to engineering solids and structural problems; The displacement method of finite element analysis using the iso-parametric formulation; Geometric modeling of solids and structures; Numerical coding with MATLAB for simple structural, fluid, and thermal analyses; Practice with commercial finite element software such as ANSYS.
Prerequisite: MATH 3410 (Diff. Eqn.), MEEN 2332 (Mech. of Matl.), MEEN 2302 (Dynamics)

Required Textbook:

References:

Methods of Evaluation and Grading Procedure:
1. Homework assignments 10 %
2. Quizzes 5 %
3. Lab Assignments 10 %
4. Two midterm exam 50 % (25% each)
5. Final report 25 %

Total 100 %

*Graduate students will have extra questions at each exam.

\[ A = 90 - 100\%; \quad B = 80 - 89\%; \quad C = 70 - 79\%; \quad D = 60 - 69\%; \quad F \leq 59\% \]
Course Learning Outcomes (CLO):

Upon completion of the course, the student will be able to

1. Solve ordinary and partial differential equations using the Galerkin method
2. Develop the finite element equations to model engineering problems
3. Program finite element solutions using MATLAB to formulate and solve structural, fluid, and thermal problems using finite element techniques.
4. Use a commercial finite element code such as ANSYS to formulate and solve structural, fluid, and thermal problems.

Assignments / Quizzes:

- Homework problems will be assigned every Wednesday.
- Assignments are due the following Wednesday.
- Homework must be turned in at the beginning of class.
- Late homework will not be accepted and homework turned into the office will not be accepted.
- In addition to the homework, a quiz will be given the following Wednesday and it consists of one of the exact HW problems or one very similar.
- All students should do their assignments for themselves. Even partial copies of your colleagues’ are not allowed. It will be considered to be a cheating or plagiarism, resulting in a zero point grade on that assignment.
- There will be NO make-up quizzes. Exceptions: medical emergency (student and important ones), transportation/traffic emergency; religious holidays/duty, jury duty and military duty. Evidences must be submitted.

Exams:

- All exams are closed book and closed notes.
- Students will only be allowed to bring in calculators and pencils for the exams.
- Equation sheets, tables, and scratch paper will be given.
- No cell phone usage during the exam.
- There will be NO make-up exams. Exceptions: medical emergency (student and important ones), transportation/traffic emergency; religious holidays/duty, jury duty and military duty. Evidences must be submitted.
- Final report due – May 1st, Friday: 5:00 pm (Submit Online - Canvas)
Disability Policy:

All reasonable accommodation will be made to facilitate special needs. If special accommodations are required, the student must first meet with the staff of the Office of Disability Accommodation (ODA), Union Suite 322, (940) 565-4323. After meeting with that office, please contact me to discuss what accommodations will be necessary. For more information, see http://www.unt.edu/oda.

Academic Dishonesty:

There is a zero tolerance policy for academic dishonesty. Cheating of whatsoever will result in an automatic ‘F’ in this course and the matter will be turned over to the appropriate student disciplinary committee.
# MEEN 4140/5800 Finite Element Analysis
**Course Outline (Subject to change)**

<table>
<thead>
<tr>
<th>WEEK</th>
<th>DATE</th>
<th>TOPIC</th>
<th>HW</th>
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<tr>
<td># 1</td>
<td>Jan. 13&lt;sup&gt;th&lt;/sup&gt; – Jan. 17&lt;sup&gt;th&lt;/sup&gt;</td>
<td>Overview &amp; Basic steps in FEM (No Lab)</td>
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<td># 2</td>
<td>Jan. 20&lt;sup&gt;th&lt;/sup&gt; – Jan. 26&lt;sup&gt;th&lt;/sup&gt;</td>
<td>CH 1.4, 1.5 Lab 1.</td>
<td>HW 1</td>
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<td># 3</td>
<td>Jan. 27&lt;sup&gt;th&lt;/sup&gt; – Jan. 31&lt;sup&gt;st&lt;/sup&gt;</td>
<td>CH 1.5, 1.6 Lab 2.</td>
<td>HW 2</td>
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<td># 4</td>
<td>Feb. 3&lt;sup&gt;rd&lt;/sup&gt; – Feb. 7&lt;sup&gt;th&lt;/sup&gt;</td>
<td>CH 1.7, 2 Lab 3.</td>
<td>HW 3</td>
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<td># 5</td>
<td>Feb. 10&lt;sup&gt;th&lt;/sup&gt; – Feb. 14&lt;sup&gt;th&lt;/sup&gt;</td>
<td>CH 3.2 Lab 4.</td>
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<td># 6</td>
<td>Feb. 17&lt;sup&gt;th&lt;/sup&gt; – Feb. 21&lt;sup&gt;st&lt;/sup&gt;</td>
<td>CH 3.2, 3.3 Lab 5.</td>
<td>HW 4</td>
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<td># 7</td>
<td>Feb. 24&lt;sup&gt;th&lt;/sup&gt; – Feb. 28&lt;sup&gt;th&lt;/sup&gt;</td>
<td>CH 4.1, 4.2 Lab 6.</td>
<td>HW 5</td>
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<td># 8</td>
<td>Mar. 2&lt;sup&gt;nd&lt;/sup&gt; – Mar. 6&lt;sup&gt;th&lt;/sup&gt;</td>
<td>CH 4.3, 4.4 Lab 7.</td>
<td>HW 6</td>
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<td># 9</td>
<td>Mar. 9&lt;sup&gt;th&lt;/sup&gt; – Mar. 13&lt;sup&gt;th&lt;/sup&gt;</td>
<td>No Class (Spring Break)</td>
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<td># 10</td>
<td>Mar. 16&lt;sup&gt;th&lt;/sup&gt; – Mar. 20&lt;sup&gt;th&lt;/sup&gt;</td>
<td>CH 5.1 Lab 8.</td>
<td>Mon. MIDTERM 2&lt;sup&gt;nd&lt;/sup&gt;</td>
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<td># 11</td>
<td>Mar. 23&lt;sup&gt;rd&lt;/sup&gt; – Mar. 27&lt;sup&gt;th&lt;/sup&gt;</td>
<td>CH 5.2, 5.3 Lab 9.</td>
<td>HW 7</td>
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<td># 12</td>
<td>Mar. 30&lt;sup&gt;th&lt;/sup&gt; – Apr. 3&lt;sup&gt;rd&lt;/sup&gt;</td>
<td>CH 7.1, 7.2, 7.3, 7.4 Lab 10.</td>
<td>HW 8</td>
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<td># 13</td>
<td>Apr. 6&lt;sup&gt;th&lt;/sup&gt; – Apr. 10&lt;sup&gt;th&lt;/sup&gt;</td>
<td>CH 11.3 Lab 11.</td>
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<td># 14</td>
<td>Apr. 13&lt;sup&gt;th&lt;/sup&gt; – Apr. 17&lt;sup&gt;th&lt;/sup&gt;</td>
<td>CH 11.4, 11.5 Lab 12.</td>
<td>HW 9</td>
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<td># 15</td>
<td>Apr. 20&lt;sup&gt;th&lt;/sup&gt; – Apr. 24&lt;sup&gt;th&lt;/sup&gt;</td>
<td>CH 12 Lab. Extra</td>
<td>HW 10</td>
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<td># 16</td>
<td>Apr. 27&lt;sup&gt;th&lt;/sup&gt; – May 1&lt;sup&gt;st&lt;/sup&gt;</td>
<td>Final report (May 1&lt;sup&gt;st&lt;/sup&gt;)</td>
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