

## ME 313: Engineering Analysis

<i>Course description:</i>	Analysis and modeling of engineering problems utilizing numerical and mathematical techniques and computers.
<i>Number of credits:</i>	3 (2-3). This course is required.
<i>Course Coordinator:</i>	J.L. Ding
<i>Prerequisites by course:</i>	MATH 315 or concurrent enrollment; CE 215; ME 116; E E 221, CPT S 121, CPT S 131, or CPT S 251
<i>Prerequisites by topic:</i>	<ol style="list-style-type: none"><li>1. Linear differential equations and systems</li><li>2. Applications of differential equations</li><li>3. Mechanics of materials</li><li>4. Computer-Aided Design and Visualization</li></ol>
<i>Postrequisites:</i>	ME 348
<i>Textbooks/other required materials:</i>	<ol style="list-style-type: none"><li>1. D.L. Logan, <i>A First Course in the Finite Element Method</i>, 5<sup>th</sup> edition, Cengage Learning, 2012.</li><li>2. R.H. Shih, <i>Introduction to Finite Element Analysis Using Solid Works Simulation</i>, SDC Publications, 2011.</li><li>3. MatLab and Simulink Student Suite, MathWorks.</li></ol>
<i>Course objectives:</i>	<ol style="list-style-type: none"><li>1. To introduce the finite element method as an engineering analysis tool.</li><li>2. To understand the basics of the finite element method.</li><li>3. To be familiarized with some commercial numerical-analysis tools for solving engineering problems.</li></ol>
<i>Topics covered:</i>	<ol style="list-style-type: none"><li>1. Numerical integration and differentiation</li><li>2. Direct stiffness method for finite element formulation</li><li>3. Finite element formulation of differential equations</li><li>4. Finite element analysis of one dimensional problem</li><li>5. Introduction to two dimensional finite element analysis</li><li>6. Hands-on exercises on commercial numerical-analysis software.</li></ol>
<i>Expected learning outcomes:</i>	<ol style="list-style-type: none"><li>1. Understand the theoretical foundation for the finite element method.</li><li>2. Be able to use some commercial numerical-analysis tools to solve engineering problems.</li></ol>
<i>Class schedule:</i>	Two 50-minute lecture sessions plus one three-hour lab session per week, for one semester.
<i>Contribution to meeting the professional component:</i>	Engineering Topics

*Relationship of course to student outcomes:*

Meets:

1. School of MME ME educational objectives: 1, 2
2. School of MME ME program outcomes: 1, 6
3. ABET EC2019, Criterion 3 program outcomes: 1, 6

*Prepared by:* Amy Johnson and J.L. Ding

*Date:* August 2, 2022

#### **POLICIES**

**A. Reasonable Accommodation** (the nature of the particular course determines which one applies):

- **Pullman Campus.** Reasonable accommodations are available for students with a documented disability. If you have a disability and need accommodations to fully participate in this class, please either visit or call the Access Center (Washington Building 217; 509-335-3417) to schedule an appointment with an Access Advisor. All accommodations MUST be approved through the Access Center.
- **WSU Online Course.** Reasonable accommodations are available in online classes for students with a documented disability. All accommodations must be approved through your WSU Disability Services office. If you have a disability and need accommodations, we recommend you begin the process as soon as possible. For more information contact a Disability Specialist on your home campus: Pullman or WSU Online (<http://accesscenter.wsu.edu>), Spokane (<http://spokane.wsu.edu/students/current/studentaffairs/disability/>), Tri-Cities (<http://www.tricity.wsu.edu/disability>), Vancouver (<http://studentaffairs.vancouver.wsu.edu/student-resource-center/disability-services>).

#### **B. Academic Integrity**

WSU expects all students to behave in a manner consistent with its high standards of scholarship and conduct. Students are expected to uphold these standards both on and off campus and acknowledge the university's authority to take disciplinary action. The Standards of Conduct for Students can be found at <http://conduct.wsu.edu>.

#### **C. WSU Safety**

WSU is committed to maintaining a safe environment for its faculty, staff, and students. Safety is the responsibility of every member of the campus community and individuals should know the appropriate actions to take when an emergency arises. In support of our commitment to the safety of the campus community the University has developed a Campus Safety Plan, <http://safetyplan.wsu.edu>. It is highly recommended that you visit this web site as well as the University emergency management web site at <http://oem.wsu.edu> to become familiar with the information provided.