

## ME 406: Experimental Design

<i>Course description:</i>	Designing, conducting, and reporting of experimental investigations involving mechanical equipment.
<i>Number of credits:</i>	3 (1-6)
<i>Course Coordinator:</i>	C.D. Richards
<i>Prerequisites by course:</i>	ME 220; ME 304; ME 306; ME 316
<i>Prerequisites by topic:</i>	<ol style="list-style-type: none"><li>1. Fluid Dynamics</li><li>2. Thermodynamics</li><li>3. Dynamics</li><li>4. Materials Science</li><li>5. Computer Aided Data Acquisition</li><li>6. Instrumentation</li><li>7. Electronic Instruments</li><li>8. Uncertainty analysis</li></ol>
<i>Textbooks/other required materials:</i>	<ol style="list-style-type: none"><li>1. A. Wheeler and A. Ganji, <i>Introduction to Engineering Experimentation</i>, Prentice Hall, 2009, 3/e.</li></ol>
<i>Course objectives:</i>	<ol style="list-style-type: none"><li>1. Learn how to design, conduct, and report experimental investigations involving mechanical equipment and systems.</li></ol>
<i>Topics covered:</i>	<ol style="list-style-type: none"><li>1. Experiments involving<ol style="list-style-type: none"><li>a. thermal fluid science</li><li>b. dynamics</li><li>c. materials characterization</li></ol></li><li>2. Professional communication skills<ol style="list-style-type: none"><li>a. memorandum writing</li><li>b. progress report writing</li><li>c. proposal writing</li><li>d. report writing</li><li>e. formal oral reporting</li></ol></li><li>3. Experimental skills<ol style="list-style-type: none"><li>a. design of experiments</li><li>b. uncertainty analysis</li><li>c. computer aided data acquisition</li></ol></li><li>4. Professional conduct<ol style="list-style-type: none"><li>a. ethics</li><li>b. professionalism</li><li>c. intellectual property and patents</li><li>d. ABET and registration</li></ol></li></ol>
<i>Expected student outcomes:</i>	<p>Outcomes for the Lecture Component:</p> <ol style="list-style-type: none"><li>a. Increased understanding of professionalism and continuation education</li><li>b. Increased understanding of intellectual property and patents</li><li>c. Increased understanding of ethic</li><li>d. Increased understanding of design of experiments</li></ol> <p>Outcomes for the Laboratory Component:</p> <ol style="list-style-type: none"><li>a. Increased understanding of the ideas of experimentation and design of experiments including:<ol style="list-style-type: none"><li>1. Designing experimental projects</li></ol></li></ol>

2. Verifying the trends of the raw data
3. Reducing and presenting experimental data
4. Estimating uncertainty of the final results
5. Comparing results with other available information
- b. Increased communication skills including:
  1. Being able to write memoranda to supervisors.
  2. Report results in the form of (1) short reports, (2) complete reports, (3) letters, and (4) progress reports
  3. Being able to give oral reports using PowerPoint and an LCD projector
  4. Being able to communicate on a one-to-one basis with (1) laboratory assistants, (2) engineers, and (3) supervisors
- c. Be able to use codes and handbooks
- d. Be able to apply the material from coursework to actual problems
- e. Be able to expand understanding of a subject by reading reference books and textbooks

*Class schedule:* One 50-minute lecture session per week, for one semester.

*Laboratory schedule:* Two 3-hour laboratory sessions per week, for one semester.

*Contribution to meeting the professional component:* Engineering Topics

*Relationship of course to program objectives:* Meets:

1. School of MME ME educational objectives: 1, 2, 3
2. School of MME ME program outcomes: 1, 3, 4, 6, 7
3. ABET EC2019, Criterion 3 program outcomes: 1, 3, 4, 6, 7

*Prepared by:* Andrea Butcherite and C.D. Richards

*Date:* May 30, 2018

## **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.