

## MSE 401: Metallic Materials

<i>Course description:</i>	Major alloy systems and manufacturing processes; materials selection.
<i>Number of credits:</i>	3
<i>Course Coordinator:</i>	I. Dutta
<i>Prerequisites by course:</i>	MSE 201
<i>Prerequisites by topic:</i>	<ol style="list-style-type: none"><li>1. Phase equilibrium and phase diagram interpretation.</li><li>2. Elementary crystallography and crystal structure.</li><li>3. Metallography.</li><li>4. Mechanical behavior of materials.</li><li>5. Inorganic chemistry.</li></ol>
<i>Postrequisites:</i>	None
<i>Textbooks/other required materials:</i>	<ol style="list-style-type: none"><li>1. Hosford, W. <i>Physical Metallurgy</i>, Taylor, 2010.</li></ol>
<i>Course objectives:</i>	<ol style="list-style-type: none"><li>1. The objective of this course is to develop an understanding of the processing of important commercial metals and alloys and to gain an appreciation for the breadth of applications for which metals are used.</li></ol>
<i>Topics covered:</i>	<ol style="list-style-type: none"><li>1. Review of the mechanical behavior of material.</li><li>2. Review of the binary iron-carbon system.</li><li>3. Analysis of the heat treatment of steel.</li><li>4. Discussion of ferrous and nonferrous alloys.</li><li>5. Discussion of important industrial metal processes, and analyze processing-structure-property relationships.</li><li>6. Discussion of metals applications and requirements in the microelectronics and storage media industries.</li></ol>
<i>Expected student outcomes:</i>	<ol style="list-style-type: none"><li>1. Understanding the nature of important families of commercial metals and alloys.</li><li>2. Understanding the practice of heat treatment.</li><li>3. Recognition of the effect of processing on microstructure and that of microstructure on properties.</li><li>4. Understanding the interplay of strength, toughness, and formability in metals and alloys.</li><li>5. Understanding the structure of metallic thin film microstructures and their relationship to requirements in microelectronics.</li><li>6. Appreciation of cost and processing.</li></ol>
<i>Class schedule:</i>	Three 50-minute lecture sessions per week, for one semester.
<i>Laboratory schedule:</i>	None
<i>Contribution to meeting the professional component:</i>	Engineering Topics
<i>Relationship of course to program objectives:</i>	Meets: <ol style="list-style-type: none"><li>1. School of MME MSE educational objectives: 1, 2, 3</li><li>2. ABET, Criterion 3 program outcomes: 1, 3, 4, 5, 7</li><li>3. School of MME MSE program outcomes: 8, 9, 10</li></ol>

*Prepared by:* Andrea Butcherite and Dr. Indranath Dutta

*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.