COURSE NUMBER & TITLE: WELD 2680-01 METALLURGY

SEMESTER/YEAR: Spring 2016

LECTURE HOURS: 2 LABORATORY HOURS: 2 CREDITS: 3
1/20/16 – 5/09/16
CLASS TIME: 1:00-2:50 p.m. MW ROOM: WT 121

INSTRUCTOR’S NAME: Mark McCool

INSTRUCTOR’S CONTACT INFORMATION:
Office Location: WT 129C
Office Phone: 268-2508
EMAIL: mccoolm@caspercollege.edu

OFFICE HOURS: As Posted

COURSE DESCRIPTION: Instruction in different grain structures of commonly used metals and their reaction to heat treatment, welding, machining, surface treatments, and mechanical stress. Various laboratory exercises on stress relief, shrinkage, fatigue, and cooling rates will be presented. The course is designed for anyone interested in welding, machining, or industrial arts requiring knowledge of classification and characteristics of metals.

EXTENDED COURSE DESCRIPTION: For any person working with metals as a machinist, welder or industrial arts instructor. Background in types and characteristics of commonly used metals and their reaction to heat treatment, welding, machining, surface treatments, and mechanical stress. Various laboratory exercises dealing with heat treatment and the physical and mechanical properties of metals.

STATEMENT OF PREREQUISITES: None

GOAL:
1. Demonstrate effective oral and written communication
2. Use the scientific method
3. Solve problems using critical thinking and creativity
4. Use quantitative analytical skills to evaluate and process numerical data
5. To develop a foundation of knowledge in the physical and mechanical properties of commonly used metals.

OUTCOMES:
1. To learn appropriate heat treatments of various metals to achieve desired results.
2. To experience various laboratory exercises dealing with the physical and mechanical properties of metal.
3. To develop safe work practices when using various testing machines and furnaces.
4. Demonstrate effective oral and written communication
5. Solve problems using critical thinking and creativity

METHODOLOGY: Two (2) lecture hours per week and two (2) lab hours for sixteen (16) weeks. Students will be evaluated on the quality of assigned laboratory exercises and there will also be six written tests to be given at approximately equally spaced times throughout the semester. We
will have a midterm as well as a final test which will a comprehensive test of the semester. Lab work and tests cannot be made up without prior notification and the instructor’s permission.

**EVALUATION CRITERIA:**
The student will be evaluated on quizzes, tests, class participation and lab projects. The quizzes will be written.

**GRADING SCALE:**

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<thead>
<tr>
<th>Score Range</th>
<th>Grade</th>
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<tbody>
<tr>
<td>100 - 90</td>
<td>A</td>
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<td>89 - 80</td>
<td>B</td>
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<td>79 - 70</td>
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<td>69 - 60</td>
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<td>59 - Below</td>
<td>F</td>
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**Attendance Policy:** Attendance is of utmost importance. Unexcused absences in the excess of 4 will result in the loss of one letter grade. Due to the consideration of the instructors and students, you must be present at the designated starting class time or you will not be allowed to participate unless prior arrangements with the instructor have been made.

**Tool Use:** Misuse of shop tools will result in the loss of tool privileges.

**REQUIRED TEXTS, READINGS, AND MATERIALS:**

- **Metallurgy Fundamentals**, Brandt

**CLASS POLICIES:**

- **Last Date to Change to Audit Status:** See current Casper College catalog.
- **Last Date to Withdraw with a W Grade:** See current Casper College catalog.

**No cell phones or other electronic devices are allowed in the classroom or laboratories.**

**SAFETY:** SAFETY GLASSES REQUIRED. Personal and equipment safety standards will be strictly enforced. It is the individual’s responsibility to develop and use a safe work attitude.

**STUDENT’S RIGHTS AND RESPONSIBILITIES:** Please refer to the Casper College Student Conduct and Judicial Code for information concerning your rights and responsibilities as a Casper College Student.

**Chain of Command:** If you have any problems with this class, you should first contact the instructor in order to solve the problem. If you are not satisfied with the solution offered by the instructor, you should then take your problem through the appropriate chain of command starting with the department head, then the Dean, and lastly the vice president for academic affairs.

**Academic Dishonesty – Cheating and Plagiarism:** Casper College demands intellectual honesty. Proven plagiarism or any form of dishonesty associated with the academic process can result in the offender failing the course in which the offense was committed or expulsion from school. See the Casper College Student Code of Conduct.

**Official Means of Communication:** Casper College faculty and staff will employ the student's assigned Casper College email account as a primary method of communication. Students are responsible to check their account regularly.

**ADA Accommodations Policy:** If you need academic accommodations because of a disability, please inform me as soon as possible. See me privately after class, or during my office hours. To
request academic accommodations, students must first consult with the college’s Disability Services Counselor located in the Gateway Building, Room 344, (307) 268-2557, bheuer@caspercollege.edu. The Disability Services Counselor is responsible for reviewing documentation provided by students requesting accommodations, determining eligibility for accommodations, and helping students request and use appropriate accommodations.

**CALENDAR OR SCHEDULE INDICATING COURSE CONTENT:**

1. **Section 1** – Introduction to Metallurgy:
   a) Practical Applications
   b) Terminology
   Test

2. **Section 2** – Properties of Metals:
   c) Hardness
   d) Material Properties
   Test

3. **Section 3** – Ferrous Metallurgy
   e) What is Steel?
   f) Manufacture of Iron and Steel
   Test
   g) Crystal Structure
   h) Failure and Deformation of Metal
   Midterm
   i) Iron-Carbon Phase Diagram
   j) Microstructural Analysis
   Test
   k) Heat Treating and Quenching
   l) Annealing and Normalizing
   m) Isothermal Transformation Diagrams
   n) Tempering and Surface Hardening
   Test

4. **Section 4** – Nonferrous Metallurgy
   o) Processing Nonferrous Metals
   p) Aluminum and Aluminum Alloys
   Test
   q) Copper, Bronze and Brass
   r) Magnesium, Zinc, Tin and Specialty Metals
   Final