

**CASPER COLLEGE  
COURSE SYLLABUS**

**COURSE NUMBER & TITLE:** WELD 2680-01 METALLURGY

**SEMESTER/YEAR:** Fall 2015

**LECTURE HOURS:** 2      **LABORATORY HOURS:** 2      **CREDITS:** 3

8/24/15 – 12/17/15

**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:** mccoollm@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. 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. 8. 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.

**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 an independent experiment of the student's choice with the instructor's approval. There will also be five (5) written tests to be given at approximately equally spaced times throughout the semester. The final test is comprehensive of the semester.

**EVALUATION CRITERIA:** The student will be evaluated on quizzes, tests and lab projects. The quizzes may be either written or practical.

**GRADING SCALE:** 100 - 90 = A  
89 - 80 = B  
79 - 70 = C  
69 - 60 = D  
59 - Below = F

**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

Reference: "Machinery's Handbook," Industrial Press

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](mailto: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. Introduction, Manufacture of Steel
2. Identification of Ferrous and Nonferrous Metals
3. Use of Charpy testing as well as other means of evaluating metals
4. Introduction to Mechanical and Physical Properties of Metal
5. Using the Rockwell and Brinell Hardness Testers
6. **TEST**
7. Crystalline Structures of Metals
8. Phase Diagrams and the Iron-Carbon Diagram
9. Hardening and Tempering of Plain Carbon Steel
10. Annealing, Normalizing and Stress Relieving
11. Iso-thermal Transformation Diagrams and Cooling Curves
12. Hardenability of Steels and Tempered Martensite
13. Heat Treating Equipment and Procedures
14. **TEST**
15. Heat Treating of Nonferrous Metals
16. The Effects of Machining on Metals
17. Metallurgy of Welds: Carbon Steel, Alloy Steel, Cast Iron
18. **TEST**
19. Nondestructive Testing
20. Service Problems
21. Corrosion in Metals
22. Powder Metallurgy
23. **TEST AND COMPREHENSIVE FINAL TEST**