

ARIZONA WESTERN COLLEGE
SYLLABUS

MFG-225 THERMAL CONDITIONING PROCESSES FOR MANUFACTURING MATERIALS

Credit Hours: 4 Lec 2 Lab 3

PREREQUISITE: any Welding (WLD) course and MFG 195

COURSE DESCRIPTION

Course of experiential study in thermal conditioning processes for manufacturing materials. Student will select an area of interest as a topic of study to include i.e. ceramics, polymers, ferrous and non-ferrous materials in manufacturing. Use of thermal process applications related to casting, conditioning, forming and joining process applications. Students in cooperation with their professor will research and review a variety of thermal conditioning processes for materials conditioning i.e. fluidized beds, austempering, molten salt baths, cryogenic, or other emerging processes. As appropriate examine related transient liquid phase (TLP) and or fusion joining processes used in advanced manufacturing. Research topics to organize a portfolio of student learning outcomes that will include data on the effects of thermal conditioning of materials, effects of thermal joining on the heat effected zone (HAZ) of the material(s). Process techniques used to achieve repeatable outcomes of hardness, and alloy distribution in effected thermally treated materials. Student research may include the use of non-metallic adhesives, and other emerging hybrid process technologies as alternates to thermal processes in manufacturing. Introductory discussion of historically used materials, joining process, and related safety practices will be included to provide the student with sufficient point of reference so as to recognize the technological differences that separates traditional thermal materials treatment and joining processes from advanced ones.

1. COURSE GOAL

Demonstrate understanding of thermal conditioning processes for manufacturing on materials as related to the performance of heat treating, forming and joining processes and their applications.

2. OUTCOMES

Upon satisfactory completion of this course, students will be able to:

- 2.1 demonstrate ability to list and explain what constitutes an advanced manufacturing material thermal conditioning, forming and joining process.
- 2.2 demonstrate ability to perform materials explorative & research activities, collect data from process applications activities and present research findings as a component of a student learning outcomes portfolio presentation.
- 2.2 explain the effects of thermal conditioning, forming and joining materials process hazards and recommended process risk mitigation strategies as they relate to persons, structures, and the work environment.
- 2.3 explain the advantages and disadvantages of advanced materials thermal conditioning processes
- 2.4 demonstrate ability to develop a data-driven process for evaluation, selection, and use of a material conditioning, forming, and our joining process for use in an advanced manufacturing setting
- 2.5 have participated in the completion of an experiential research project related to the applications of advanced materials conditioning, forming, and or joining by; simulation, employment, internship at a local advanced manufacturing plant where materials conditioning, forming and or joining is applied and complete an evaluation report of the processes used.
- 2.6 Organize a portfolio of student learning outcomes associated with the course and present the findings of the student experiential lab activities, written project reports by make an oral presentation of finding for adjudication and assignment of the final grade.

3. METHODS OF INSTRUCTION

- 3.1 Lecture

- 3.2 Multi-media Presentations
- 3.3 Individual and Group Discussions
- 3.4 Individual and Group Research Projects
- 3.5 Experiential learning

4. LEARNING ACTIVITIES

- 4.1 Group Discussions
- 4.2 Oral Presentations
- 4.3 Individual and Group Research Projects
- 4.4 Classroom Demonstrations
- 4.5 Field Trips

5. EVALUATION

- 5.1 Quizzes/Exams
- 5.2 Assignments
- 5.3 Completion of Participation in Individual and Group Research Projects

6. STUDENT RESPONSIBILITIES

- 6.1 Under AWC Policy, students are expected to attend every session of class in which they are enrolled.
- 6.2 Classroom Assignments: Students are responsible for work missed and for completing all work before the next class meeting. Students are responsible for participating in all oral drills and for taking all exams.
- 6.3 If a student is unable to attend the course or must drop the course for any reason, it will be the responsibility of the student to withdraw from the course. Students who are not attending as of the 45th day of the course may be withdrawn by the instructor. If the student does not withdraw from the course and fails to complete the requirements of the course, the student will receive a failing grade.
- 6.4 Americans with Disabilities Act Accommodations: Arizona Western College provides academic accommodations to students with disabilities through AccessABILITY Resource Services (ARS). ARS provides reasonable and appropriate accommodations to students who have documented disabilities. It is the responsibility of the student to make the ARS Coordinator aware of the need for accommodations in the classroom prior to the beginning of the semester. Students should follow up with their instructors once the semester begins. To make an appointment call the ARS front desk at (928) 344-7674 or ARS Coordinator at (928) 344-7629, in the College Community Center (3C) building, next to Advising.
- 6.5 Academic Integrity: Any student participating in acts of academic dishonesty including, but not limited to, copying the work of other students, using unauthorized "crib notes", plagiarism, stealing tests, or forging an instructor's signature—will be subject to the procedures and consequences outlined in AWC's Student Code of Conduct.
- 6.6 Textbooks and materials: Students are required to bring notebook or loose-leaf book, pens, pencils, dictionaries, and purchase textbook required for class.
- 6.7 Arizona Western College students are expected to attend every class session in which they are enrolled. To comply with Federal Financial Aid regulations (34 CFR 668.21), Arizona Western College (AWC) has established an Attendance Verification process for "No Show" reporting during the first 10 days of each semester.
Students who have enrolled but have never attended class may be issued a "No Show" (NS) grade by the professor or instructor and receive a final grade of "NS" on their official academic record. An NS grade may result in a student losing their federal financial aid.
For online classes, *student attendance in an online class is defined as the following* (FSA Handbook, 2012, 5-90):

- Submitting an academic assignment
- Taking an exam, an interactive tutorial or computer-assisted instruction
- Attending a study group that is assigned by the school
- Participating in an online discussion about academic matters
- Initiating contact with a faculty member to ask a question about the academic subject studied in the course