

Washtenaw Community College Comprehensive Report

WAF 210 Welding Metallurgy Effective Term: Winter 2025

Course Cover

College: Advanced Technologies and Public Service Careers

Division: Advanced Technologies and Public Service Careers

Department: Welding and Fabrication

Discipline: Welding and Fabrication

Course Number: 210

Org Number: 14600

Full Course Title: Welding Metallurgy

Transcript Title: Welding Metallurgy

Is Consultation with other department(s) required: No

Publish in the Following: College Catalog , Time Schedule , Web Page

Reason for Submission: Three Year Review / Assessment Report

Change Information:

Outcomes/Assessment

Rationale: I have completed the course assessment report for this course and have found that the outcomes could be improved to better support the objectives of this course.

Proposed Start Semester: Winter 2024

Course Description: In this course, students will be introduced to grain structure, atomic structure and phase transformations. They will recognize and illustrate the various aspects of extractive, mechanical and physical metallurgy including the theory and practice of metal identification, selection, processing, fabrication, conditioning and testing of ferrous and non-ferrous materials. Heat-treating of various common industry materials will be discussed and students will analyze the root cause of weld failure and identify solutions.

Course Credit Hours

Variable hours: No

Credits: 3

Lecture Hours: Instructor: 45 **Student:** 45

Lab: Instructor: 15 **Student:** 15

Clinical: Instructor: 0 **Student:** 0

Total Contact Hours: Instructor: 60 **Student:** 60

Repeatable for Credit: NO

Grading Methods: Letter Grades

Audit

Are lectures, labs, or clinicals offered as separate sections?: NO (same sections)

College-Level Reading and Writing

College-level Reading & Writing

College-Level Math

Level 2

Requisites

Prerequisite

WAF 140 minimum grade "C"
and

Prerequisite

WAF 232 minimum grade "C"

General Education

Request Course Transfer

Proposed For:

Eastern Michigan University
Ferris State University
Other : Pennsylvania College of Technology

Student Learning Outcomes

1. Differentiate between the various properties of ferrous and nonferrous metals before and after heat treatment and hardening processes.

Assessment 1

Assessment Tool: Outcome-related written exam
Assessment Date: Fall 2025
Assessment Cycle: Every Three Years
Course section(s)/other population: All
Number students to be assessed: All
How the assessment will be scored: Answer key
Standard of success to be used for this assessment: 80% of students will score 80% or higher.
Who will score and analyze the data: Departmental faculty

Assessment 2

Assessment Tool: Outcome-related laboratory exercise and report
Assessment Date: Fall 2025
Assessment Cycle: Every Three Years
Course section(s)/other population: All
Number students to be assessed: All
How the assessment will be scored: Departmentally-developed rubric
Standard of success to be used for this assessment: 80% of students will score 80% or higher.
Who will score and analyze the data: Departmental faculty

2. Describe and apply phase diagrams when working with ferrous and nonferrous metals.

Assessment 1

Assessment Tool: Outcome-related written exam
Assessment Date: Fall 2025
Assessment Cycle: Every Three Years
Course section(s)/other population: All
Number students to be assessed: All
How the assessment will be scored: Answer key
Standard of success to be used for this assessment: 80% of students will score 80% or higher.
Who will score and analyze the data: Departmental faculty

3. Perform destructive testing on various metals to identify their mechanical properties.

Assessment 1

Assessment Tool: Outcome-related lab activity
Assessment Date: Fall 2025
Assessment Cycle: Every Three Years

Course section(s)/other population: All

Number students to be assessed: All

How the assessment will be scored: Departmentally-developed rubric

Standard of success to be used for this assessment: 80% of students will score 80% or higher.

Who will score and analyze the data: Departmental faculty

4. Perform proper material identification, weld process selection, and filler metal selection for welding of ferrous and non-ferrous metals.

Assessment 1

Assessment Tool: Outcome-related lab activity

Assessment Date: Fall 2025

Assessment Cycle: Every Three Years

Course section(s)/other population: All

Number students to be assessed: All

How the assessment will be scored: Checklist with rubric

Standard of success to be used for this assessment: 80% of students will score 80% or higher.

Who will score and analyze the data: Departmental faculty

Course Objectives

1. Identify various types of ferrous and non-ferrous metals.
2. Compare and contrast characteristics of ferrous and non-ferrous metals.
3. Identify the different types of mechanical testing equipment used on ferrous and non-ferrous metals.
4. Perform mechanical tests on ferrous and non-ferrous metals.
5. Identify different types of chemical test used on ferrous and non-ferrous metals.
6. Perform chemical tests on ferrous and non-ferrous metals.
7. Identify different physical tests used on ferrous and non-ferrous metals.
8. Perform physical tests on ferrous and non-ferrous metals.
9. Perform a macro and micro inspection on ferrous and non-ferrous metals.
10. Identify the difference between the iron carbon and isothermal phase diagrams.
11. Identify heat treatment processes used for ferrous and non-ferrous metals.
12. Apply several heat treatment processes on ferrous and non-ferrous metals.
13. Recognize hardening processes used for ferrous and non-ferrous metals.
14. Apply various hardening processes on ferrous and non-ferrous metals.
15. Interpret the results of heat treatment and hardening processes on ferrous vs. non-ferrous metals.
16. Perform non-destructive testing on ferrous and non-ferrous metals.
17. Identify several crystal structures and their mechanical properties.
18. Compare crystal structures and properties of ferrous and non-ferrous metals.
19. Polish and etch samples of ferrous and non-ferrous metals for macro and micro inspection.

New Resources for Course

Course Textbooks/Resources

Textbooks

B. J. Moniz. *Metallurgy*, ed. American Technical Publishers, 2012

Manuals

Periodicals

Software

Equipment/Facilities

Level III classroom

Reviewer

Action

Date

Faculty Preparer:

Ashley Jones

Faculty Preparer

Jul 13, 2023

Department Chair/Area Director:

Glenn Kay II *Recommend Approval* *Aug 14, 2023*

Dean:

Jimmie Baber *Recommend Approval* *Aug 17, 2023*

Curriculum Committee Chair:

Randy Van Wagnen *Recommend Approval* *Jun 27, 2024*

Assessment Committee Chair:

Jessica Hale *Recommend Approval* *Jul 05, 2024*

Vice President for Instruction:

Brandon Tucker *Approve* *Jul 05, 2024*

Washtenaw Community College Comprehensive Report

WAF 210 Welding Metallurgy Effective Term: Spring/Summer 2018

Course Cover

Division: Advanced Technologies and Public Service Careers

Department: Welding and Fabrication

Discipline: Welding and Fabrication

Course Number: 210

Org Number: 14600

Full Course Title: Welding Metallurgy

Transcript Title: Welding Metallurgy

Is Consultation with other department(s) required: No

Publish in the Following: College Catalog , Time Schedule , Web Page

Reason for Submission: Three Year Review / Assessment Report

Change Information:

Outcomes/Assessment

Objectives/Evaluation

Rationale: Recently completed the assessment. Making updates to the master syllabus based on the assessment report.

Proposed Start Semester: Spring/Summer 2018

Course Description: In this course, students will be introduced to grain structure, atomic structure and phase transformations. They will recognize and illustrate the various aspects of extractive, mechanical and physical metallurgy including the theory and practice of metal identification, selection, processing, fabrication, conditioning and testing of ferrous and non-ferrous materials. Heat-treating of various common industry materials will be discussed and students will analyze the root cause of weld failure and identify solutions.

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College-Level Math

Level 2

Requisites

Prerequisite

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and

Prerequisite

WAF 232 minimum grade "C"

General Education

Request Course Transfer

Proposed For:

Eastern Michigan University

Ferris State University

Other : Pennsylvania College of Technology

Student Learning Outcomes

1. Differentiate grain structures and properties of ferrous and nonferrous metals before and after heat treatment.

Assessment 1

Assessment Tool: Written exam

Assessment Date: Fall 2019

Assessment Cycle: Every Three Years

Course section(s)/other population: All

Number students to be assessed: All

How the assessment will be scored: Answer key

Standard of success to be used for this assessment: 80% of students will score 80% or higher.

Who will score and analyze the data: Departmental faculty

Assessment 2

Assessment Tool: Laboratory exercise and report

Assessment Date: Fall 2019

Assessment Cycle: Every Three Years

Course section(s)/other population: All

Number students to be assessed: All

How the assessment will be scored: Departmentally-developed rubric

Standard of success to be used for this assessment: 80% of students will score 80% or higher.

Who will score and analyze the data: Departmental faculty

2. Identify different phase diagrams when working with ferrous and non-ferrous materials.

Assessment 1

Assessment Tool: Written exam

Assessment Date: Fall 2019

Assessment Cycle: Every Three Years

Course section(s)/other population: All

Number students to be assessed: All

How the assessment will be scored: Answer key

Standard of success to be used for this assessment: 80% of students will score an average of 80% or higher.

Who will score and analyze the data: Departmental faculty

3. Use different types of testing equipment to identify metals as ferrous or non-ferrous and their physical properties.

Assessment 1

Assessment Tool: Lab Activity

Assessment Date: Fall 2019
Assessment Cycle: Every Three Years
Course section(s)/other population: All
Number students to be assessed: All
How the assessment will be scored: Departmentally-developed rubric
Standard of success to be used for this assessment: 80% of students will score 80% or higher.
Who will score and analyze the data: Departmental Faculty

4. Apply and describe the effects of heat treatments and hardening processes for ferrous and non-ferrous metals.

Assessment 1

Assessment Tool: Written exam
Assessment Date: Fall 2019
Assessment Cycle: Every Three Years
Course section(s)/other population: All
Number students to be assessed: All
How the assessment will be scored: Answer key
Standard of success to be used for this assessment: 80% of the class will score a minimum of 80%.
Who will score and analyze the data: Departmental faculty

Assessment 2

Assessment Tool: Lab Activity
Assessment Date: Fall 2019
Assessment Cycle: Every Three Years
Course section(s)/other population: All
Number students to be assessed: All
How the assessment will be scored: Departmentally-developed rubric
Standard of success to be used for this assessment: 80% of students will score a minimum of 80%.
Who will score and analyze the data: Departmental faculty

5. Perform destructive and non-destructive testing on ferrous and non-ferrous metals.

Assessment 1

Assessment Tool: Lab activity
Assessment Date: Fall 2019
Assessment Cycle: Every Three Years
Course section(s)/other population: All
Number students to be assessed: All
How the assessment will be scored: Checklist with rubric
Standard of success to be used for this assessment: 80% of students will score a minimum of 80%.
Who will score and analyze the data: Departmental faculty

Course Objectives

1. Identify various types of ferrous and non-ferrous metals.
2. Compare and contrast characteristics of ferrous and non-ferrous metals.
3. Identify the different types of mechanical testing equipment used on ferrous and non-ferrous metals.
4. Perform mechanical tests on ferrous and non-ferrous metals.
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8. Perform physical tests on ferrous and non-ferrous metals.
9. Perform a macro and micro inspection on ferrous and non-ferrous metals.

10. Identify the difference between the iron carbon and isothermal phase diagrams.
11. Identify heat treatment processes used for ferrous and non-ferrous metals.
12. Apply several heat treatment processes on ferrous and non-ferrous metals.
13. Recognize hardening processes used for ferrous and non-ferrous metals.
14. Apply various hardening processes on ferrous and non-ferrous metals.
15. Interpret the results of heat treatment and hardening processes on ferrous vs. non-ferrous metals.
16. Perform non-destructive testing on ferrous and non-ferrous metals.
17. Identify several crystal structures and their mechanical properties.
18. Compare crystal structures and properties of ferrous and non-ferrous metals.
19. Polish and etch samples of ferrous and non-ferrous metals for macro and micro inspection.

New Resources for Course

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Periodicals

Software

Equipment/Facilities

Level III classroom

<u>Reviewer</u>	<u>Action</u>	<u>Date</u>
Faculty Preparer: <i>Bradley Clink</i>	<i>Faculty Preparer</i>	<i>Aug 22, 2017</i>
Department Chair/Area Director: <i>Glenn Kay II</i>	<i>Recommend Approval</i>	<i>Aug 23, 2017</i>
Dean: <i>Brandon Tucker</i>	<i>Recommend Approval</i>	<i>Aug 24, 2017</i>
Curriculum Committee Chair: <i>Lisa Veasey</i>	<i>Recommend Approval</i>	<i>Nov 29, 2017</i>
Assessment Committee Chair: <i>Michelle Garey</i>	<i>Recommend Approval</i>	<i>Nov 30, 2017</i>
Vice President for Instruction: <i>Kimberly Hurns</i>	<i>Approve</i>	<i>Dec 02, 2017</i>