

EICC COURSE DEVELOPMENT MODEL (CDM)

CATALOG COURSE NUMBER: MFG-190

COURSE TITLE: Metallurgy

Originating College: CCC MCC SCC

Effective Term/Year: Fall 2014

Initiating Faculty Member: Kenneth Darmody

Initiating Department Coordinator: Ben Kettering

Reason for submission: Check all that apply

New Course If yes, type of course:

A&S

To be considered for General Education? Yes No Category:

To be part of an A & S Concentration? Yes No Concentration:

CTE Program Title: Required Elective

General Education or Program Review Reactivation of an inactive course Making course inactive

Changing course; please explain:

Other; please explain:

Contact Hours/Distribution of Contact Hours

Lecture Hours

Lab Hours

Clinical Hours

Coop Hours

Hours per Week: 1.00 Hours per Week: 2.00 Hours per Week: 0 Hours per Week: 0

Number of Weeks: 16.50 Number of Weeks: 16.50 Number of Weeks: 16.50 Number of Weeks: 16.50

***Note: If offering a course for the full fall or spring semester, the number of weeks is 16.5*

Total Lecture Hrs: 19.80 Total Lab Hrs: 39.60 Total Clinical Hrs: 0 Total Coop Hrs: 0

Semester Hours Credit: 2.00 if variable credit, give range:

Allow repeat* for credit: Yes No

If yes, total course repeats allowed: If yes, total credits:

*Note that repeat for credit means a student can pass the course and then repeat it for additional credit. An internship course is an example of a course that could be set up as repeatable for additional credit

Course or courses this CDM replaces, if any:

CATALOG COURSE DESCRIPTION: This course teaches students the basic theory of ferrous and non-ferrous metals. In addition, this course focuses on how metals differ in terms of hardness, brittleness, durability, resistance to corrosion, machinability and weldability.

RECOMMENDED ENTRY LEVEL SKILLS/KNOWLEDGE:

PRE-REQUISITE COURSES

CCN#	COURSE TITLE

CO-REQUISITE COURSES

CCN#	COURSE TITLE

PUBLISHED MATERIAL(S) USED FOR CDM DEVELOPMENT: Kibbe, Richard, John Neely, Warren White, and Roland Meyer. Machine Tool Practices. Upper Saddle River: Prentice Hall, 2010.
Series 100 Fundamentals-Course 105:Metals in the Plant. Buffalo Grove: TPC Training Systems, 2012.

In general it is expected that source material will be dated within 5 years of this CDM date. If all materials/ textbooks cited above are older than this, please explain:

GENERAL COURSE GOALS

Upon successful completion of this course the student should be able to:

- Identify ferrous metals.
- Identify non-ferrous metals.
- Identify properties of metals.
- Identify types of iron and steel and their properties.
- Identify types of steel and their individual properties.
- Understand heat treating processes.
- Identify various grades of copper, aluminum, magnesium and titanium and their various properties.
- Identify various grades of lead, nickel, tin and zinc and their individual properties.

TOPICAL OUTLINE

1. Introduction to Metals
2. Properties of Metals
3. Manufacturing Processes
4. Properties of Iron and Steel
5. Properties of Standard Steels
6. Heat Treating
7. Properties of Copper
8. Properties of Aluminum
9. Properties of Magnesium and Titanium
10. Properties of Lead, Nickel, Tin and Zinc

COURSE OBJECTIVES

Upon successful completion of the course, a student should be able to:

1. Introduction to Metals
 - a. Identify five metals or alloys commonly used in industry.
 - b. Identify five mechanical properties of metals.
 - c. Describe the uses of three metal alloys.
 - d. Describe the metal working processes of casting, forming and machining.
2. Properties of Metals
 - a. Identify the definitions of four mechanical properties of metals.
 - b. Describe the three kinds of stress.
 - c. Identify the ways in which a metal can fail.
3. Manufacturing Processes
 - a. Identify four kinds of molds used in casting.
 - b. Describe extrusion.
 - c. Identify the steps involved in making a part by powder metallurgy.
 - d. Describe the differences between hot-chamber and cold-chamber die-casting.
4. Properties of Iron and Steel
 - a. Identify the commercial grades of cast iron.
 - b. Identify the mechanical properties of the grades of cast iron.
 - c. Describe the forms in which carbon appears in commercial grades of cast iron.
 - d. Describe the process of smelting.
5. Properties of Standard Steels
 - a. Describe the definition of steel.
 - b. Describe how to conduct a spark test.
 - c. Identify steel sheets having as-rolled edges and cut edges.
 - d. Describe two differences between alloy steels and steels containing only iron and carbon.
6. Heat Treating
 - a. Describe the two basic processes of heat treating.
 - b. State the four major purposes of heat treating.
 - c. Identify why distortion and cracking occur during welding.
 - d. Define low, medium and high carbon steels.
 - e. Describe how to anneal, harden and temper a steel drill.
7. Properties of Copper
 - a. Identify the steps in producing copper from ore.
 - b. Describe the contents of red brass and its uses.

- c. Identify the three groups of brasses, based on their zinc content and the three categories of hardness.
8. Properties of Aluminum
- Define wrought-grade and casting grade aluminums.
 - Identify the advantages of aluminum-silicon alloys.
 - Describe how aluminum is anodized.
 - Identify the advantages and disadvantages of the oxide coating on aluminum.
9. Properties of Magnesium and Titanium
- Identify the alloys of magnesium.
 - Identify the useful properties of magnesium and titanium.
 - Identify the alloys of titanium.
 - Describe how to join magnesium alloys.
 - Describe the precautions that must be taken when working with magnesium and titanium.
10. Properties of Lead, Nickel, Tin and Zinc
- Describe the properties and characteristics of lead.
 - Describe how tinplate is manufactured.
 - Describe how zinc is refined and processed.
 - Identify the properties that are improved by adding nickel to stainless steel.

RECOMMENDED METHODS OF INSTRUCTION: *Check all appropriate methods of instruction to facilitate student learning of course objectives.*

- | | |
|--|---|
| <input type="checkbox"/> Case Studies | <input type="checkbox"/> Class Discussions |
| <input type="checkbox"/> Computer lab work | <input checked="" type="checkbox"/> Computer-assisted tools |
| <input type="checkbox"/> Computer-assisted writing | <input type="checkbox"/> Conducting experiments |
| <input checked="" type="checkbox"/> Demonstration or modeling | <input type="checkbox"/> Electronic interaction |
| <input type="checkbox"/> Field observation | <input type="checkbox"/> Field trips |
| <input type="checkbox"/> Guest speaker | <input checked="" type="checkbox"/> Guided practice |
| <input type="checkbox"/> In-class writing or editing workshops | <input type="checkbox"/> Journals |
| <input checked="" type="checkbox"/> Lecture | <input type="checkbox"/> Library instruction and resources |
| <input type="checkbox"/> Model building | <input type="checkbox"/> Peer review |
| <input type="checkbox"/> Readings | <input type="checkbox"/> Role play |
| <input type="checkbox"/> Service learning | <input type="checkbox"/> Simulation |
| <input checked="" type="checkbox"/> Student and instructor conferences | <input type="checkbox"/> Student collaborative learning |
| <input type="checkbox"/> Student presentation | <input checked="" type="checkbox"/> Student projects |
| <input type="checkbox"/> Tests or quizzes | <input type="checkbox"/> Worksheets/surveys |
| <input type="checkbox"/> Writing assignments/exercises (graded or not) | |
| <input checked="" type="checkbox"/> Other (please list specifics): Videotapes, Mill Projects | |

RECOMMENDED EVALUATION METHODS: *Check all appropriate methods of evaluation to assess student achievement of course objectives.*

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|--|---|
| <input type="checkbox"/> Class workshops | <input type="checkbox"/> Classroom discussions/participation |
| <input type="checkbox"/> Collaborative work | <input checked="" type="checkbox"/> Demonstration of skill(s) |
| <input checked="" type="checkbox"/> Individual conferences | <input type="checkbox"/> Journals |
| <input type="checkbox"/> Laboratory reports | <input type="checkbox"/> Oral presentations |
| <input type="checkbox"/> Portfolios | <input type="checkbox"/> Pretest/Posttest |
| <input checked="" type="checkbox"/> Quizzes | <input type="checkbox"/> Reading responses |
| <input type="checkbox"/> Student presentations | <input checked="" type="checkbox"/> Student projects |
| <input checked="" type="checkbox"/> Tests | <input type="checkbox"/> Writing Assignments |
| <input type="checkbox"/> Other (please list specifics): | |

ATTENDANCE: Policies on attendance will be formulated by the instructor and communicated to the students on the course syllabus.

ACADEMIC DISHONESTY: Policies on academic dishonesty can be found in the EICC student code of conduct published in the student handbook.

CDM CREATION/REVIEW/REVISION INFORMATION

Originally Written by: _____ Date: _____

Department Chair, Comments, & Date: _____

Does similar curriculum exist at other EICC Colleges? CCC MCC SCC No

If yes, Counterparts Consulted, College, Comments & Date: _____

CDM Review or Revision Date:

Faculty member(s) & College: _____

Does similar curriculum exist at other EICC Colleges? CCC MCC SCC No

Changes made to course which will require further review steps:

Making course inactive Credit hours Contact hours Course Description

25% or more of course objectives Other minor revisions or no revisions

Dean Review, Comments & Date: _____

If changes made require further review and approval:

College Curriculum Committee Sign-off & Date: _____

IC Review Subcommittee Sign-off & Date: _____

Instructional Council Approval: _____