

**IME 352 – Metal Casting
Course Syllabus – Fall 2006**

Catalog Description (2006 – 2007): Principles of pattern design, molding, melting, filling and process analysis using a variety of materials and production techniques. Solidification of metals and alloys as a nucleation and grain growth process. Formation of inclusions and other casting defects will be discussed. Theory and practice in metal casting principles using green sand, shell, permanent, investment, centrifugal, and lost foam processes.

Prerequisites: Understanding of mechanical, physical, thermal, and chemical properties of industrial materials (MSE 254 or ME 250 & MSE 255).

Textbook: Technology of Metalcasting, Fred P. Schleg, American Foundry Society.

Course Coordinator: Sam Ramrattan, FEF Key Professor

Learning Objective¹:

1. To understand the importance of metal casting in an industrial society. (j)
2. To understand the quality control aspects of the cast metals industry. (c & k)
3. To work safely in teams and solve foundry related problems. (e & f)

¹ Letter in parenthesis refers to ABET **EAC Criterion 3** / *TAC Criterion 2*, categories *a – k*.

Performance Criteria²:

Objective 1

- Document the historical, contemporary, and future significance of the cast metals industry. [1,4]
- Review the current literature in the metal casting field. [5]
- Identify educational and career opportunities available in the cast metals industry. [5]
- Identify the technical aspects of the cast metals industry. [1-9]

Objective 2

- Identify defects found on metal castings. [3,6,7,9]
- Identify the major processing parameters in casting metals. [6-9]

Objective 3

- Demonstrate the safe operation of foundry processing equipment. [6-9]
- To perform standardized testing procedures used in the cast metals industry. [7,8]

²*Numbers in brackets refer to the method of evaluation as listed in Evaluation.*

Evaluation:

1. Homework Assignments	(30%)
2. Attendance/Participation	(5%)
3. Exams (3)	(45%)
4. Final Exam	(20%)

Course Schedule:

<u>Week</u>	<u>Topic</u>
1.	History of casting
2.	Gravity & Low pressure casting
3.	High pressure casting processes
4.	Specialized casting processes
5.	Foundry layout, Material handling, and Automation
6.	Solidification and Phase Diagrams
7.	Cooling curves and Microstructures
8.	Ferrous castable metals
9.	Nonferrous castable metals
10.	Sand - Types, Control, Additives, & System Management
11.	Casting defects
12.	Sand Core making processes
13.	Risers and gating systems for Pattern design
14.	Refractories & Furnace types
15.	FINAL – COMPREHENSIVE

Professional Component

This course addresses ABET Criterion 4 (EAC) requirement for professional component as follows:

- (a) College level math, basic science: (20%)
- (b) Engineering topics (engineering Science): (80%)
- (c) General education (communication, teamwork, professional development, ethics): (0%)

Relationship to IME Program Educational Objectives / Student Learning Outcomes

This course provides significant support for the following IME program outcomes:

- 1. a, b, c, e; 2. a, c, e, f; 3. a, b

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