

# MATSCEN 5451

# Molten Metal Processing

## Course Description

An advanced class in application of thermodynamics, kinetics, and macro-transport phenomena to primary metals production, refining, and solidification processing.

**Prior Course Number:** MSE667 and MSE668

**Transcript Abbreviation:** Molten Metal Proc

**Grading Plan:** Letter Grade

**Course Deliveries:** Classroom

**Course Levels:** Undergrad, Graduate

**Student Ranks:** Junior, Senior, Masters, Doctoral, Professional

**Course Offerings:** Spring

**Flex Scheduled Course:** Never

**Course Frequency:** Every Year

**Course Length:** 14 Week

**Credits:** 3.0

**Repeatable:** No

**Time Distribution:** 3.0 hr Lec

**Expected out-of-class hours per week:** 6.0

**Graded Component:** Lecture

**Credit by Examination:** No

**Admission Condition:** No

**Off Campus:** Never

**Campus Locations:** Columbus

**Prerequisites and Co-requisites:** MATSCEN 2251, MATSCEN 3151; or graduate standing; or permission of instructor.

**Exclusions:** Not open to students with credit for ISE 651.02, MSE 667, MSE 668, MSE 5451, or ISE 5502

**Cross-Listings:** ISE 5502

**Course Rationale:** Existing course.

**The course is required for this unit's degrees, majors, and/or minors:** No

**The course is a GEC:** No

**The course is an elective (for this or other units) or is a service course for other units:** Yes

**Subject/CIP Code:** 14.3101

**Subsidy Level:** Baccalaureate Course

## Programs

Abbreviation	Description
MATSCEN	Materials Science and Engineering

## Course Goals

Students will learn extraction, refining, and processing of metals.
Students will learn metal casting science and technology.
Students will learn solidification science and technology.
Students will learn recycling of metals.
Students will learn numerical simulation of casting processes.

## Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Ferrous Extractive Metallurgy	6.0							
Non-ferrous Extractive Metallurgy	18.0							
Solidification	3.0							
Continuous Casting	3.0							
Cast Alloys	3.0							
Shape Casting	3.0							
Casting Processes	4.0							
Other Solidification Processes	2.0							
Casting Simulation	6.0							

## Representative Assignments

One term paper on extractive metallurgy
One project assignment on casting simulations

## Grades

Aspect	Percent
Five quizzes	20%
Two assignments (term paper and simulation)	20%
One mid-term exam	30%
Final Exam	30%

## ABET-EAC Criterion 3 Outcomes

Course Contribution		College Outcome
***	a	An ability to apply knowledge of mathematics, science, and engineering.
	b	An ability to design and conduct experiments, as well as to analyze and interpret data.
**	c	An ability to design a system, component, or process to meet desired needs.
	d	An ability to function on multi-disciplinary teams.
**	e	An ability to identify, formulate, and solve engineering problems.
*	f	An understanding of professional and ethical responsibility.
*	g	An ability to communicate effectively.
*	h	The broad education necessary to understand the impact of engineering solutions in a global and societal context.
*	i	A recognition of the need for, and an ability to engage in life-long learning.
**	j	A knowledge of contemporary issues.
***	k	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

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