

## Course Syllabus

### Purdue University, School of Materials Engineering

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**MSE 597S**

**Steels: Processing and Properties**

**Fall 2007**

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**Lecture:** MWF 2:30-3:20, POTR 268

#### **Instructors**

Prof. David R. Gaskell, MSEE 386K, 765-494-7703, gaskell@ecn.purdue.edu  
Prof. Kevin P. Trumble, MSEE 308K, 765-494-4114, driscoll@ecn.purdue.edu

#### **Objectives**

To understand the processing and resulting microstructure modifications that influence the properties and performance of steels used for structural applications in the transportation, construction, discrete products and other industries.

#### **Description**

Introduction to steelmaking to provide an understanding of how the final product is influenced by the initial processing; the influence of subsequent processing, such as mechanical working and heat treating on the properties of steel. The goal is for the student to recognize and understand the differences among the varieties of steel and not just focus on standard handbook property values. By developing an understanding of the microstructural basis for properties, the course will provide the "know-how" for better design with steel and competing materials.

#### **Prerequisites**

Introductory undergraduate courses in materials science, chemistry and physics.

#### **Textbook**

G. Krauss, Steels : Processing, Structure, and Performance, ASM International (2005) ISBN 0-087170-817-5. This book is available at a 50% discount to students taking this course, but only when purchased directly through the publisher, ASM. Students should call 1-800-336-5152 ext. 0 and state that they are using the book for this class.

#### **Homework**

Short homework sets will be assigned approximately every two weeks. Homework and other course information will be posted at <http://www.itap.purdue.edu/ilt/ecourses/>

#### **Exams**

There will be a written midterm exam in class and a written, comprehensive final exam. The exam questions will be drawn heavily from the homework and readings.

<b>Grading</b>	Homework Sets (~5)	25%
	Midterm Exam (October 12)	30%
	Final Exam (TBA)	45%

## **MSE 597S Fall 2007**

### **Brief Outline**

*(Approximate number of lectures by topic indicated in parentheses)*

#### **Introduction - Processing, Properties and Structures of Steels (2)**

*Profs. David Gaskell and Kevin Trumble*

#### **Part I - Production of Iron and Steel (10)**

*Prof. Gaskell*

- A. Raw materials and the blast furnace (2)
- B. Thermodynamic treatment of the blast furnace (3)
- C. Basic oxygen furnace (2)
- D. Electric arc Furnace (1)
- E. Secondary refining (1)
- F. Continuous casting (1)

#### **Part II - Processing and Microstructures of Steels (9)**

*Prof. Gaskell*

- A. Iron and Ferrite (3)
- B. Cementite and Pearlite (3)
- C. Martensite (2)
- D. Bainite (2)

Midterm Exam (1)

#### **Part III - Processing and Properties of the Main Steel Classifications (19)**

*Prof. Kevin Trumble*

- A. Low-carbon sheet steels (6)
- B. Ferrite-Pearlite steels (3)
- C. Heat-treated steels (3)
- D. High-strength steels (2)
- F. Stainless steels (3)
- G. Tool steels (2)

Final Exam