Mechanical Engineering Dept. Department

Syllabus
ME 478: Iron and Steel Making (3-0-3)

Course Catalog Description:

Introduction to extractive metallurgy and iron ore dressing including the following topics: iron ores, mining, and ore dressing. Production of pig iron. The blast furnace. Production of steel. Bessemer process, basic oxygen process, open-hearth process, direct reduction process, and electric-furnace process. Continuous casting.

Course Pre-requisites:

- ME 216: Materials Science and Engg.
- ME 217: Materials Lab

Course Objectives:

1. To present the fundamental concepts of iron and steel making
2. To explain furnace properties, materials chemistry, and process thermodynamics

Course Learning Outcomes:

CLO1. Describe how to make iron and steel from raw materials

CLO2. Explain the role of thermodynamics and kinetics in the iron and steel making

CLO3. Explain the processing factors affecting the quality of iron and steel and design necessary procedure to economically produce iron and steel for application

CLO4. Conduct laboratory experiments, analyze data and interpret results related to iron and steel making

CLO5. Design necessary procedure to economically produce iron and steel for application

CLO6. Analyze contemporary issues and emerging technologies related to iron and steel making

Learning Resources:

- Basic Concepts of Iron and Steel Making, Sujay Kumar Dutta, Yakshil B. Chokshi, 1st edition, 2020, Springer Nature Singapore Pte Ltd., Singapore.
- Ironmaking and Steelmaking, Zushu Li and Claire Davis , 2019, MDPI, Switzerland
- Instructor’s handouts
- Research/technical papers on related topics

Lecture Assessment Plan:

Assessment Task	Week Due	Weight
Term project	14	25.0%
Final Exam	16-17	45.0%
Major exam	7	30.0%

Lecture Weekly Schedule:

Week#	Topics
1	Extractive metallurgy of Iron ore
2	Extractive metallurgy of Iron ore (Continue)
	Blast Furnace Process
3	Blast Furnace Process (Continue)
	Blast Furnace Reactions and Operation of Blast Furnace
4	Blast Furnace Reactions and Operation of Blast Furnace (Continue)
5	Raw Materials for DR Processes
6	Raw Materials for DR Processes (Continue)
	Sponge Iron, Smelting Reduction Processes
7	Sponge Iron, Smelting Reduction Processes (Continue)
	Thermodynamics of Reduction and Kinetics of ironmaking
8	Thermodynamics of Reduction and Kinetics of ironmaking (Continue)
	Raw Materials for Steelmaking
9	Raw Materials for Steelmaking (Continue)
	Steelmaking Processes
10	Steelmaking Processes (Continue)
11	Oxygen Steelmaking Processes
12	Electric Furnace Processes
13	Secondary Steelmaking
14	Continuous Casting
15	Thermodynamics of Steelmaking