MT248 Jan 3

MODELLING AND COMPUTATIONAL METHODS IN METALLURGY

Instructor

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Teaching Assistant

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Department: Materials Engineering

Course Time: 11-12:30AM

Lecture venue:

Detailed Course Page:

Announcements

Brief description of the course

This course provides the foundation in concepts of physical and mathematical modelling in materials processing to pursue the higher levels of study in Metallurgy/Materials/Chemical and other related engineering disciplines. The course develops the studentâ€™s understanding of physical and mathematical modelling through a learning progression beginning with introduction of physical and mathematical models and ending with simulation of real life problems.

Prerequisites

Knowledge of transport phenomena or course on Transport Processes in Process Metallurgy â€“ Fundamentals, Knowledge of any programming language

Syllabus

Basic principles of physical and mathematical modelling. Similarity criteria and dimensional analysis. Detailed study of the modelling of various metallurgical processes such as blast furnace, induction furnace, ladle steelmaking, carburizing, rolling, sintering and drying. Introduction to Finite Difference Method and solution of differential equations using various numerical techniques in brief.

Course outcomes

This course will provide a sound knowledge of relevant tools that are necessary to build physical and mathematical models to describe the complex physical phenomena pertaining to real world and simulate their behaviour at laboratory and pilot scale. After completing this course one should be able to apply the knowledge gained in this subject to many other complex engineering systems/processes.

Grading policy

Assignments 30%

Term Project 20-30%

Exam - 50-40%

Assignments

Resources

J. Szekely, J.W. Evans and J.K. Brimacombe: The Mathematical and Physical Modelling of Primary Matals Processing Operations, John Wiley, New York, 1988.

J. Szekely Fluid Flow Phenomena in Metals Processing, Academic Press, New York, 1979.

B. Carnahan, H.A. Luther and J.O. Wilkes: Applied Numerical Methods, John Wiley, NY, 1969.

Additional learning: Other books and research paper references will be provided during the lecture