Browse Syllabus

Subject Numbering	TME-MSE220J
Year	2022
Subject	Materials Science and Engineering B
Credit(s)	2
Instructor	TAKAHIRO MIKI KATSUNARI OIKAWA KOMIN SHU
Notes	

Language	English
Object in Class subject and Object and summary of class and Goal of study(J)	1. 目的 金属の製錬プロセスに関する化学熱力学的な基礎を習得し、さらに種々の金属の具体的な製錬法に関する知識を習得することを目的とする。 2. 概要 本科目は、短期留学生受け入れプログラムで来日した留学生に対する講義を兼ねているので、英語で講義する。序論においては金属製錬プロセスに関する反応の平衡論を理解させ、各論においては鉄鋼、銅、アルミニウム、その他の金属の製錬法の特徴を理解させて、鉱石からの製錬の流れを講義する。 3. 達成目標等 ・本学科の学習・教育目標のA、B、C、D、Kに関する能力を含めて習得する。 ・金属製錬プロセスの基礎となる熱力学的平衡関係を理解し、各種製錬プロセスに関する基礎的知識を習得する。
Object in Class subject and Object and summary of class and Goal of study	Objective This course focus on the principle of chemical thermodynamic of refining process of metals and specific knowledge of each process of various metals. Outline English is used in this class because this course combine with the course for foreign students of short term program. At first, we focus on principle of equilibria of chemical reaction of metal processing, and then refining process of steels, copper, aluminum and other metals to understand the basic procedure and chracteristic Outcomes Understand the thermodynamic equilibrium of metal refining process Understand the basic knowledge of various refining process of metals This course include the contents of our program outcomes of A, B, C, D, K
Other subject is relevant and complete a point to notice(J)	材料物理化学I、材料物理化学IIを履修していることが望ましい。
Other subject is relevant and complete a point to notice	Physical chemistry for Materials I, Physical chemistry for Materials II
Contents and progress schedule of class(J)	I Thermodynamics for materials processing (K. OIKAWA) 1 Introduction of chemical metallurgy 2 Thermodynamic functions and reduction/oxidation equilibrium for materials 3 Ellingham diagram of chemical compounds 4 Prediction of equilibrium oxygen potential at the desired conditions 5 Prediction of heat needed for the given reaction II Pryometallurgy (T. MIKI) 6 Fundamentals of pyrometallurgy 7 Basic principle of iron and steelmaking 8 Iron- and Steelmaking process 9 Basic principle of copper smelting 10 Refining of copper and other metals III Hydrometallurgy and Electrometallurgy (H. ZHU) 11 Fundamentals of electrochemistry 12 Hydrometallurgy of zinc and other metals 13 Aluminum smelting 14 Active metal processing IV Summary 15 Final examination
Contents and progress schedule of class	I Thermodynamics for materials processing (K. OIKAWA) 1 Introduction of chemical metallurgy 2 Thermodynamic functions and reduction/oxidation equilibrium for materials 3 Ellingham diagram of chemical compounds

	4 Prediction of equilibrium oxygen potential at the desired conditions 5 Prediction of heat needed for the given reaction II Pryometallurgy (T. MIKI) 6 Fundamentals of pyrometallurgy 7 Basic principle of iron and steelmaking 8 Iron- and Steelmaking process 9 Basic principle of copper smelting 10 Refining of copper and other metals III Hydrometallurgy and Electrometallurgy (H. ZHU) 11 Fundamentals of electrochemistry 12 Hydrometallurgy of zinc and other metals
self study(J)	予習・復習を含めた自習（課題を含む）を行うこと.
self study	Students required to make self-directed learning including review and preparations.
Record and evaluation method(J)	出席，宿題，定期試験の成績を総合して判定する。(定期試験が行えない場合は，出席やレポートで判定する)
Record and evaluation method	attendance to the class, home work and final Exam. (attendance to the class and report if the final exam can not be set by the trouble of corona virus)

Textbook and references

No	Title	Author	Publisher	Year	ISBN/ISSN	Classification
1.	『金属化学入門シリーズ1 金属物理化学』	日本金属学会編		1996	4889030115	
2.	『金属化学入門シリーズ3 金属製錬工学』	日本金属学会編		1999	4889030123	
3.	『Introduction to metallurgical thermodynamic』	David R. Gaskell	McGrow-Hill		0070229457	
4.	『Principles of Extractive Metallurgy, Vol. 3 Pyrometallurgy』	F. Habashi	Gordon and Breach		2881240410	
5.	『 Aluminium Electrolysis -- Fundamentals of the Hall-Heroult Process』	J. Thonstad			3870171294	

URL	材料科学総合学科学習教育到達目標 https://www.material.tohoku.ac.jp/department/purpose.html 材料科学総合学科カリキュラム http://www.material.tohoku.ac.jp/ugrad/curriculum.html
Attached file	
Office hours(J)	随時（事前に教員に連絡をとること）
Office hours	Any time (Contact the lecture in advance)
Notes	記号A-Mについては、マテリアル・開発系の教育目標を参照してください。 https://www.material.tohoku.ac.jp/department/purpose.html
Practical business	
In addition	
Last Update	2022/03/01 14:00
	1単位の授業科目は、45時間の学修を必要とする内容をもって構成することを標準としています。1単位の修得に必要となる学修時間の目安は、「講義・演習」については15～30時間の授業および授業時間外学修（予習・復習など）30～15時間、「実験、実習及び実技」については30～45時間の授業および授業時間外学修（予習・復習など）15～0時間です。 One-credit courses require 45 hours of study. In lecture and exercise-based classes, one credit consists of 15-30 hours of class time and 30-15 hours of preparation and review outside of class. In laboratory, practical training, and practical skill classes, one credit consists of 30-45 hours of class time and 15-0 hours of preparation and review outside of class.

One-credit courses require 45 hours of study. In lecture and exercise-based classes, one credit consists of 15-30 hours of class time and 30-15 hours of preparation and review outside od class. In laboratory, practical skill classes, one credit consists of 30-45 hours of class time and 15-0 hours of preparation and review outside of class.