Pós-Graduação em Engenharia de Materiais
Programa de Disciplinas

Disciplina: RED145-Reaction Process Engineering for Materials Engineers		
Carga Horária: 30h	**Caráter**: Optativa	**Créditos:** 02
Cursos para os quais é ministrada: Mestrado / Doutorado		
Professores: **I.** Paulo Santos Assis **II.** Tateo Usui (Osaka University, Japan) **III.**		

Ítem	Sub-ítem	Prof.	Ref.	Horas
Ementa	Fundamental items for Reaction Process Engineering are delivered on the basis of Transport Phenomena (Fluid Dynamics and Heat & Mass Transfer), Thermodynamics and Chemical Reaction Kinetics. The present lecture covers mathematical treatments of reactions in general and reactions in Metallurgical and Materials processing, focusing on Ironmaking and Steelmaking			
Programa	(1) Introduction to "Reaction Process Engineering for Metallurgist" (2) Fundamental items for chemical reactions (I) Classification of reactions (3) Fundamental items for chemical reactions (II) Characteristic of reactors (4) Mathematical treatments of reactions in general (I) Definition of reaction rate (5) Mathematical treatments of reactions in general (II) Expression for reaction rate (6) Reaction rate analyses for Metallurgical and Materials processing (a) Reaction models for gas / solid reaction (i) Unreacted-core shrinking model for one interface Four times including exercises (6, 7, 8, 9) (ii) Unreacted-core shrinking model for three interfaces Two times including exercises (10, 11) (iii) Unreacted-core shrinking model for six interfaces Two times including exercises (12, 13) (iv) Diffusional reaction models (14) (b) Reaction models for the other heterogeneous reactions (15)			

AVALIAÇÃO: EXERCÍCIOS EM AULA

Referências Bibliográficas

Disciplina: RED145- Reaction Process Engineering for Materials Engineers	
1.	R. B. Bird, W. E. Stewart and E. N. Lightfoot: Transport Phenomena, (1960), John Wiley & Sons
2.	H. Schlichting: Boundary-Layer Theory, (1968), McGraw-Hill.
3.	T. Usui, M. Naito, T. Murayama and Z. Morita: Kinetic Analysis on Gaseous Reduction of Agglomerates, Part 1, Reaction Models for Gaseous Reduction of Agglomerates, Tetsu-to-Hagané, 80(1994)6, pp.431 – 439.
4.	T. Usui, Y. Nakamuro, M. Nishi, M. Naito, H. Ono and P. S. Assis: Gaseous Reduction Model for Sinter in Consideration of Calcium Ferrite Reaction Process (Unreacted-Core Shrinking Model for Six Interfaces), Tetsu-to-Hagané, 100 (2014)2, pp.294 – 301.