



**UNIVERSITY OF MISKOLC
FACULTY OF MATERIALS SCIENCE AND
ENGINEERING**

**ANTAL KERPELEY DOCTORAL SCHOOL
OF MATERIALS SCIENCE & TECHNOLOGY**



Solidification

Zsolt Veres

COURSE DESCRIPTION

2017.

Solidification

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Lecture of the course

Zsolt Veres, associate professor, Department of Physical Metallurgy, Metalforming and Nanotechnologies.

Building: B1, Room: 7., e-mail: femvezso@uni-miskolc.hu,

Language of course

English.

The aims of the course

High knowledge of follows: equilibrium phase diagrams, processes of solidification, phase transformations, grain nucleation and growth, processes in case of equilibrium and non-equilibrium, microsegregation, directional crystallization

Education method

Lectures (with board, and Powerpoint)

Topics of Lectures

1. Briefing, Introduction
2. Bases of Thermodynamics and Phase Diagrams
3. Binary Phase Diagrams I. (unlimited solubility, eutectic systems, compounds)
4. Binary Phase Diagrams II. (eutectoid systems, peritectic systems)
5. Binary Phase Diagrams III. (Monotectic systems, real alloy systems)
6. Ternary Phase Diagrams I. (Basics, Rules, Metal Alloys)
7. Ternary Phase Diagrams I. (Oxides)
8. Nucleation and growth of grains.
9. Crystallization of Solid solutions, in equilibrium, non-equilibrium
10. Micro- and macro segregation,
11. Crystallization of Eutectic
12. Directional crystallization

Recommended literature

1. Kurz W.: Fundamentals of Solidification
2. Stefanescu D.M. : Science and Engineering of Casting Solidification
3. Glicksman M. E. : Principles of Solidification
4. Fredriksson H., Akerlind U.: Materials Processing during Casting
5. Flemings M.C.: Solidification processing

Examination

Written test and written exam.

Complex exam questions

1. Cooling of a liquid, morphology of solid/liquid interface, temperature distribution at solid/liquid interface, temperature gradient
2. Nucleation of pure metals and solid solutions
3. Micro and macro segregation
4. Eutectic solidification
5. Peritectic reaction