“Advanced Solidification”

Fall 2018_M1569.000200

Professor Eun Soo Park

Syllabus

Location: **33-229**
Meeting time: **Tuesday 11:00-13:45**
Class web page: http://etl.snu.ac.kr/portal/index.jsp

Teaching staff

Instructor: **Eun Soo Park**
Office: **33-313**
Telephone: **02-880-7221**
Email: espark@snu.ac.kr
Office hours: **by appointment**

***Text*:** BRUCE CHALMERS, "**PRINCIPLES *of* SOLIDIFICATION**",
John Wiley & Sons, Inc (1964)

***References*:** 1) MERTON C. FLEMINGS, "**Solidification Processing**",
McGraw-Hill Book Company, INC (1974)
2) W. KURZ, "**Fundamentals of Solidification**",
TRANS TECH PUBLICATION (1984)
3) G.J. DAVIES, "**Solidification and Casting**",
JOHN WILEY & SONS (1973)

Additional reading materials will be provided.

***Course Description*:**

This course provides a critical review of the state of knowledge and understanding of the process of solidification, defined for this purpose as the discontinuous change of state from liquid to crystalline solid. In particular, this course is intended to provide an understanding of the physical processes that relate to solidification and to show how these processes combine to produce the phenomena observed in practical situations. An essential aim of many solidification processes is to obtain optimum properties in the resultant material. This course can provide a working knowledge of how the solidification principles can be utilized to produce structures with improved mechanical or physical properties, which then can be used to solve problems involving materials and process design.

Schedule

week 1 *Brief introduction* I*: the relevant thermodynamic laws, properties, and relationship*

week 2 *Solidification as an Atomic Process* I

week 3 *Solidification as an Atomic Process* II

week 4 *Nucleation* I

week 5 *Nucleation* II

week 6 *Microscopic Heat Flow Consideration* I

week 7 *Microscopic Heat Flow Consideration* II

week 8 *Reduction of Solute during solidification* I

week 9 *Reduction of Solute during solidification* II

week 10 *Polyphase Solidification* I

week 11 *Polyphase Solidification* II

week 12 *Macroscopic Heat Flow and Fluid Flow* I

week 13 *Macroscopic Heat Flow and Fluid Flow* II

week 14 *The Structure of Cast Metals* I

week 15 *The Structure of Cast Metals* II

Components of Your Grade:

1) Exams (mid: 30% + final: 35%)

There will be two exams, each of which will take 2-3 hours. The exams will be conceptual and difficult. In general, I will not use class time for the exams and instead will reserve separate time slots.

2) Reports and Presentation (15%)

Assignments handed in after the start of class lose credit depending on the timing. If you wish, you may work together on homework assignments. But, you must hand in your own work, in your own words.

3) Quizzes (15%) and Attendance (5%)

Remarks: The weight of each grade component may change up to 5% depending on the student's achievement.

Course Policies, Questions and Answers

Q: Will there be a recitation section?

A: None is planned, but if you really want one, speak up. We can negotiate.
Although most class periods will be lecture, I am hoping that the weekly class meetings will proceed in a discussion style format, so please do ask questions.

Q: What is the policy for attendance?

A: Please be on time. Being late disrupts the instructor and other students. If you cannot attend a class, please let me know in advance by email.

Q: What is the policy for late homework?

A: Late assignments go to my office. If I'm not around, slide it under my door and leave me an email so that I know when you turned it in.

Prof. Eun Soo Park
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