



# Satuan Acara Pengajaran

ENMT800002 - Kinetika & Transformasi Fasa

Pengajar

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*Prof. Dr. Ir. Bondan Tiara M.Si.*

Minggu 1

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| <b>Materi</b> | Introduction (Rules, Grading, Marking)<br>1. Review on Thermodynamics and Phase Equilibrium:<br>a. Single Component System<br>b. Binary Component System<br>c. The Phase Rule<br>d. Binary Phase Diagrams:<br>- Two phase equilibrium<br>- Three phase equilibrium<br>- Exercise on two phase and three phase equilibrium<br>- Reactions in the solid state |
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| <b>Media</b> | LCD Projector |
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| <b>Referensi</b> | 1. Porter, D. A and Easterling, K.E, Phase Transformation in Metals and Alloys, 2nd. ed., CRC Press, 2003.<br>2. Prince, A, Multicomponent Alloy Constitutional Bibliography, The Metals Society, London, 1978<br>3. West, DRF, Ternary Equilibrium Diagrams, Chapman and Hall, 1982 |
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Support materials:

1. Chapter 5, 9 and 10 of: Callister, W.D, Materials Science and Engineering: An Introduction, 6th ed., Wiley., 2004
  2. Lennart Backerud, Guocai Chai, and Jarmo Tamminen, Solidification Characteristics of Aluminum Alloys-Volume 2: Foundry Alloy
  3. Lars Arnberg, Lennart Backerud, and Guocai Cahi, Solidification Characteristics of Aluminum Alloys-Volume 3: Dendrite Coherency
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## Aktivitas

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### Minggu 2

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**Materi**

- e. Fe-Fe<sub>3</sub>C Phase Diagram
- f. Ternary System Representation
- g. Ternary System containing 2 phase
- h. Exercise

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**Media** LCD Projector

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**Referensi**

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**Aktivitas**

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### Minggu 3

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**Materi** Diffusion in Materials:

- a. Atomic mechanism of diffusion
- b. Fick's first law for steady state diffusion
- c. Interstitial diffusion
- d. Substitutional diffusion

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**Media** LCD Projector

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**Referensi**

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**Aktivitas**

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### Minggu 4

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**Materi** Diffusion in Materials (cont.):

- d. Tracer diffusion in binary alloys
- e. Diffusion in multiphase binary system
- f. Journal review

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**Media** LCD Projector

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**Referensi**

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**Aktivitas**

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### Minggu 5

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**Materi** Solution for Fick's 2nd law:  
- Homogenization  
- Thin film solution  
- Carburization and decarburization  
- Diffusion from a Finite Source into Semi Infinite Media  
- Case studies

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**Media** LCD Projector

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**Referensi**

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**Aktivitas**

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## Minggu 6

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**Materi** Crystal Interface and Microstructure (1)  
a. Interfacial free energy  
b. Grain boundary  
c. Case study in Crystal Interface

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**Media** LCD Projector

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**Referensi**

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**Aktivitas**

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## Minggu 7

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**Materi** Crystal Interface and Microstructure (2)  
d. Interphase interfaces in solids  
e. Interface migration

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**Media** LCD Projector

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**Referensi**

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**Aktivitas**

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## Minggu 8

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**Materi** Midterm

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**Media**

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## Referensi

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## Aktivitas

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### Minggu 9

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**Materi** Solidification (1)  
a. Nucleation in pure metals  
b. Growth of pure solid  
c. Solidification of alloy

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**Media** LCD Projector

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## Referensi

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## Aktivitas

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### Minggu 10

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**Materi** Solidification (2)  
d. Application of solidification theory in casting and welding  
e. Solidification during quenching from the melts  
f. Case study

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**Media** LCD Projector

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## Referensi

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## Aktivitas

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### Minggu 11

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**Materi** Diffusional Transformation in Solids (1)  
a. Homogeneous and heterogeneous nucleation in solids  
b. Precipitate growth  
c. Transformation kinetics

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**Media** LCD Projector

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## Referensi

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## Aktivitas

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## Minggu 12

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**Materi** Diffusional Transformation in Solids (2)  
d. Eutectoid transformation  
e. Ordering transformation  
f. Case study

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**Media** LCD Projector

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**Referensi**

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**Aktivitas**

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## Minggu 13

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**Materi** Diffusionless Transformation in Solids:  
a. Theories of martensite nucleation  
b. Martensite growth  
c. Tempering of ferrous martensite  
d. Martensite transformation in nonferrous metals

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**Media** LCD Projector

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**Referensi**

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**Aktivitas**

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## Minggu 14

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**Materi** Diffusionless Transformation in Solids (2)  
e. Exercise  
f. Case study in Diffusionless transformation

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**Media** LCD Projector

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**Referensi**

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**Aktivitas**

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## Minggu 15

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**Materi** - Class review  
- Question and answer session

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**Referensi**

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**Aktivitas**

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Minggu 16

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**Materi** Final examination

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**Media**

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**Referensi**

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**Aktivitas**

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