



Satuan Acara Pengajaran

ENMT801016 - Rekayasa Permukaan Material Lanjut

Pengajar

Wahyuaji Narottama Putra S.T., M.T.

Minggu 1

Materi	Class Introduction General Rules Grading Class Outline Teamwork Learning Simulation
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Media	Laptop, LCD
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Referensi	Karl-Erik Thelning, 'Steel and its heat treatment,' Butterworths, 1984. ASM Handbook Vol. 4; Heat Treating, ASM International, Ohio, USA, 1991. ASM Handbook Vol. 5; Surface Engineering, ASM International, Ohio, USA, 1994. Rointan F. Bunshah: Handbook of Hard Coatings, Deposition Technologies, Properties and Applications, Noyes Publications, Park Ridge, New Jersey, 2001. Hugh O. Pierson: Handbook of Chemical Vapor Deposition (CVD) Principles, Technology, and Applications, Noyes Publications, Park Ridge, New Jersey, 1999. Arthur A. Tracton: Coatings Technology Handbook, CRC Press Taylor & Francis Group, Boca Raton, 2006
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Aktivitas	Lecture, group discussion
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Minggu 2

Materi Fundamental of Surface Engineering:
- Part Surface Requirements
- Selecting surface technologies
- Processes for surface treatment
- Classification of surface engineering

Media Laptop, LCD

Referensi ASM Handbook Vol 4: Heat Treating, ASM International, Ohio, USA, 1991.
ASM Handbook Vol 5: Surface Engineering, ASM International, Ohio, USA, 1994

Aktivitas Lecture. Quiz

Minggu 3

Materi Surface Cleaning:
- Factors in selection
- Cleaning options: Mechanical, Chemical, Biological
- Inhibitors

Media Laptop, LCD

Referensi Rointan F. Bunshah: Handbook of Hard Coatings, Deposition Technologies, Properties and Applications, Noyes Publications, Park Ridge, New Jersey, 2001.
Hugh O. Pierson: Handbook of Chemical Vapor Deposition (CVD) Principles, Technology, and Applications, Noyes Publications, Park Ridge, New Jersey, 1999.
Arthur A. Tracton: Coatings Technology Handbook, CRC Press Taylor & Francis Group, Boca Raton, 2006.

Aktivitas Lecture. Problem based learning

Minggu 4

Materi Team Work Problem-Based Learning
- Material Failure
- Failure Analysis
- Self assessment
- Group Assessment

Media Laptop, LCD

Referensi Rointan F. Bunshah: Handbook of Hard Coatings, Deposition Technologies, Properties and Applications, Noyes Publications, Park Ridge, New Jersey, 2001.
Hugh O. Pierson: Handbook of Chemical Vapor Deposition (CVD) Principles, Technology, and Applications, Noyes Publications, Park Ridge, New Jersey, 1999.
Arthur A. Tracton: Coatings Technology Handbook, CRC Press Taylor & Francis Group, Boca Raton, 2006.

Aktivitas Class lecture, group discussion

Minggu 5

Materi Surface Finishing:
- Tolerance, consistency
- Surface quality
- Surface texture
- Surface integrity
- Surface alterations
- Cutting edges finishing
- Non-abrasive finishing

Media Laptop, LCD

Referensi ASM Handbook Vol 5: Surface Engineering, ASM International, Ohio, USA, 1994.
Helmi A. Youssef and Hassan El-Hofy: Machining technology: machine tools and operations, CRC Press Taylor & Francis Group, Boca Raton 2008
J.T. Black and Ronald A. Kohser: DeGarmo's Materials and Process in Manufacturing, 10th Ed., John Wiley & Sons, Inc., Hoboken NJ, 2008

Aktivitas Class lecture

Minggu 6

Materi Selected Traditional Surface Engineering:
- Painting
- Electroplating
- Anodizing
- Thermal and plasma spraying
- Diffusion: Nitriding, carburizing, boriding
- Selective: Flame and induction

Media Laptop, LCD

Referensi ASM Handbook Vol 4: Heat Treating, ASM International, Ohio, USA, 1991.
ASM Handbook Vol 5: Surface Engineering, ASM International, Ohio, USA, 1994.

Aktivitas Class lecture

Minggu 7

Materi Mid Term Examination

Media

Referensi

Aktivitas Examination

Minggu 8

Materi Enhanced Surface Engineering:
- Laser treatment
- Physical vapor deposition
- Chemical vapor deposition

Media Laptop, LCD

Referensi ASM Handbook Vol 4: Heat Treating, ASM International, Ohio, USA, 1991.
ASM Handbook Vol 5: Surface Engineering, ASM International, Ohio, USA, 1994

Aktivitas Class lecture

Minggu 9

Materi Case Study:
Surface Engineering and Their Characterization

Media Laptop, LCD, Journal

Referensi Hitoshi Habuka and Masaki Tsuji: Surface & Coatings Technology 217
(2013) 88-93

Aktivitas Independent learning and problem solving

Minggu 10

Materi Physical vapor deposition
- Principle of PVD
- Two classes of PVD: Evaporation and Sputtering
- Processes in PVD

Media Laptop, LCD

Referensi ASM Handbook Vol 5: Surface Engineering, ASM International, Ohio, USA, 1994.
A.A. Tracton: Coatings Technology Handbook, Taylor & Francis Group, Boca Raton, 2006
R. F. Bunshah: Handbook of Deposition Technologies for Films and Coatings Science, Technology and Applications, Noyes Publications, Park Ridge, NJ 1994
D. M. Mattox: Handbook of Physical Vapor Deposition (PVD) Processing Film Formation, Adhesion, Surface Preparation and Contamination Control, Noyes Publications, Westwood, NJ 1998

Aktivitas Class lecture

Minggu 11

Materi Fundamental of Chemical Vapor Deposition
- Theoretical analysis
- Rate limiting
- Microstructure
- Equipment
- Reactions

Media Laptop, LCD

Referensi 1. A.A. Tracton: Coatings Technology Handbook, Taylor & Francis Group, Boca Raton, 2006
R. F. Bunshah: Handbook of Deposition Technologies for Films and Coatings Science, Technology and Applications, Noyes Publications, Park Ridge, NJ 1994
H. O. Pierson: Handbook of Chemical Vapor Deposition (CVD) Principles, Technology, and Applications, 2nd Ed., Noyes Publications, Park Ridge, NJ 1999

Aktivitas Class lecture

Minggu 12

Materi Material Characterization:
- X-ray diffraction
- Small angle X-ray scattering
- Neutron scattering
- Small angle neutron scattering
- Gas adsorption

Media Laptop, LCD

Referensi G. Cao: Nanostructures and Nanomaterials, Imperial College Press, London, 2004.
C.P. Poole, Jr., and F.J. Owens: Introduction to Nanotechnology, John Wiley & Sons, Inc., 2003.
E.L. Wolf, Nanophysics and Nanotechnology, an Introduction to Modern Concepts in Nanoscience, WILEY-VCH Verlag GmbH & Co. KGaA, 2004.

Aktivitas Class lecture

Minggu 13

Materi Journal Reading:
Chemical reaction engineering in the design of CVD reactors

Media Laptop, internet

Referensi H. Komiyama!, Y. Shimogaki, Y. Egashira: Chem. Eng. Sci. 54 (1999) 1941-1957

Aktivitas Journal reading. Quiz

Minggu 14

Materi Journal reading:
Understanding the chemical vapor deposition of diamond: recent progress

Media Laptop, internet

Referensi J. E. Butler, Y. A. Mankelevich, A. Cheesman, JieMa, and M.N. R. Ashfold: J. Phys. Condens. Matter 21 (2009) 364201

Aktivitas Journal reading, assignment

Minggu 15

Materi Final Term Examination

Media

Referensi

Aktivitas Examination
