Satuan Acara Pengajaran

ENMT801016 - Rekayasa Permukaan Material Lanjut

Pengajar
Dr. Ir. Myrna Ariati Mochtar M.S.
Wahyuaji Narottama Putra S.T., M.T.

Minggu 1

Materi	Class Introduction General Rules Grading Class Outline Teamwork Learning Simulation
Media	Laptop, LCD
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
Aktivitas	Lecture, group discussion

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