

ENMAT 101A Engineering Materials & Processes

PART (1)

CLASS LESSON NOTES FOR BASIC CONCEPTS AT FOUNDATION/ADVANCED DIPLOMA LEVEL

In this subject you will learn about the structure, properties and usage of a variety of materials used in engineering applications. You will develop specialised knowledge relating to:

- Material structure and properties
- Mechanical properties
- Metals - ferrous and non-ferrous
- Polymers
- Ceramics
- Composites, concrete, other
- Basic destructive testing
- Steel – FeC (Iron/Carbon), heat treatment
- Casting - perm/non-perm
- Forming - hot, cold
- Processes - PowderM, welding, Rapid Proto
- Polymer processes - IM, BM, extrus, thermoset, composites
- Joining - fasteners, weld, non-fusion
- Corrosion
- Surface treatments - plating, coatings, peening, anodising
- Non-destructive testing
- Quality assurance and control, certified testing, safety, materials safety data sheets (MSDS)
- Economic and environmental issues - production/recycling.

[E081 Material Science](#)

http://www.filefactory.com/file/pq2r36bvgnv/n/E081_Material_Science1_pdf
[Non Metallic Materials](#)

http://www.filefactory.com/file/2czhyovkn32x/n/Materials_ppt

Engineering Mechanics

http://www.filefactory.com/file/63sqtnrqf55/n/ME_103_Engineering_Mechanics_zip

Chemical Thermodynamics

http://www.filefactory.com/file/5ussq0pnpi4t/n/ME_207_Chemical_thermodynamics_pdf

Introduction-to-polymer-science-and-technology

http://www.filefactory.com/file/6epib0ijvbjt/n/ME_209_Introduction-to-polymer-science-and-technology_pdf

http://www.filefactory.com/file/7dhamrs5c3z7/n/ME207_zip

[ME 305+ ME 209](#)

http://www.filefactory.com/file/76fbf48z2h7j/n/ME305_ME209_zip

PART (2)

REFERENCE TEXT BOOKS & WEEKLY –LESSONS AT ASSOCIATE DEGREE LEVEL (SELF STUDY)

TEXT BOOK- Textbooks can be copied from USBs & DVD.

Prescribed Text:

Higgins, R. & Bolton, W., 2010, *Materials for Engineers and Technicians*, 5th Edition, Butterworth Heinemann, Oxford UK. ISBN 9781856177696.

WEEK	LECTURES / EXAMINATIONS	LABORATORY	QUIZ
Orientation Week	Orientation activities Review of syllabus and assessment activities. Laboratory orientation. Academic Foundations: Note taking; study skills; introduction to conducting research.		
Week 1	Lecture (2 hrs): Readings: Ch 1: Engineering materials; Ch 2: Properties of materials.	Laboratory 1 (2 hrs): Hardness test	
Week 2	Lecture (2 hrs): Readings: Ch 3: Mechanical testing; Ch 4: The crystal structure of metals.	Laboratory 2 (2 hrs): Tensile Test	
Week 3	Lecture (2 hrs): Readings: Ch 5: Casting process; Ch 6: Mechanical deformation of metals; Ch 7: The mechanical shaping of metals.	Laboratory 3 (2 hrs): Metal Casting	10101
Week 4	Lecture (2 hrs): Readings: Ch 8: Alloys; Ch 9: Equilibrium diagrams; Ch 10: Practical microscopy	Laboratory 4 (2 hrs): Microscopy, Weld samples	10102
Week 5	Lecture (2hrs): Readings: Ch 11: Iron and steel; Ch 12: The heat-treatment of plain-carbon steels	Laboratory 5 (2 hrs): Torsion, Bending Tests	10103
Week 6	Lecture (2hrs): Readings: Ch 13: Alloy steels; Ch 14: The surface hardening of steels; Ch 15: Cast iron.	Laboratory 6 (2 hrs): Heat Treatment	
Week 7	Examination Week A: Assessment 2: Short answer test on content from weeks 1 to 5 (Ch1 to Ch15) 15%	Assessment 3 due: Portfolio of Laboratory Reports 1, 2, 3 & 4 - 15%	
Week 8	Lecture (2hrs): Readings: Ch 16: Copper and its alloys; Ch 17: Aluminium and its alloys; Ch 18: Other non-ferrous metals and their alloys.	Laboratory 7 (2 hrs): Polymer tensile test,	10105

WEEK	LECTURES / EXAMINATIONS	LABORATORY	QUIZ
Week 9	Lecture (2hrs): Readings: Ch 19: Plastics materials and rubbers; Ch 20: Properties of plastics.	Site Visit: e.g. Rolling Mill, Materials process/testing	
Week 10	Lecture (2hrs): Readings: Ch 21: Ceramics; Ch 22: Glasses; Ch 23: Composite materials.	Demo: Epoxy FRC, thermoforming	10106
Week 11	Lecture (2hrs): Readings: Ch 24: Fibre-reinforced composite materials; Ch 25: Methods of joining materials.	Laboratory 8 (2 hrs): Dye, Mag, Ultrasound	10104
Week 12	Lecture (2hrs): Readings: Ch 26: Causes of failure; NDT; Material Standards.	Laboratory 9 (2 hrs): Product Study	10107
Week 13	Lecture (2 hrs): Readings: Ch 27 Choice of Materials and Processes; Design. Economic, Environmental, Social Issues.	Assessment 4 due: Collaborative Report (Product Study) 15%	10108
Week 14	Study Week		
Week 15	Examination Week B: Assessment 5: Written examination: 30%	Assessment 3 due: Portfolio of Laboratory Reports 5, 6, 7, 8 & 9 - 15%	