

Course Code : ME 771

Course Title : Advanced engineering Materials

Credit Hours : 3

Course Description

Crystal structures, Diffusion in metals, Solidification of metals, Equilibrium diagrams, Heat treatment of metal alloys, Defects in materials, Strengthening of materials, Advanced materials, Properties and applications (ceramics, polymers, composites), Materials selection.

Course Objectives

To cover the main topics of modifying materials structure and properties, and to provide the students with the latest developments in material technology and applications of new advanced materials.

Course Topics

Week no. 1: Crystal structures

Week no. 2: Crystal structures

Week no. 3: Diffusion in metals

Week no. 4: Solidification of metals

Week no. 5: Equilibrium diagrams

Week no. 6: Equilibrium diagrams

Week no. 7: Heat treatment of metal alloys / 7th week evaluation.

Week no. 8: Heat treatment of metal alloys

Week no. 9: Defects in materials.

Week no. 10: Strengthening of materials

Week no. 11: Advanced materials

Week no. 12: Advanced materials / 12th week evaluation

Week no. 13: Properties and applications (ceramics, polymers, composites)

Week no. 14: Materials selection

Week no. 15: Materials selection

Week no. 16: Final Examination

References

William D. Callister, "Materials Science and Engineering – An Introduction"

James F. Shackelford, "Introduction to Materials Science for Engineers"

William F. Smith, "Foundations of Materials Science and Engineering".

Flinn and Trojan, "Engineering Materials and Their Applications"

- Mahmoud M. Farag, "Materials Selection for Engineering Design"