ME 666 Plastics Engineering (3-0-0-6)

Polymers: classification, structure, molecular weight, polymerization, crystallization, glass transition and viscoelasticity. Dynamic mechanical behavior: rheology, creep recovery and stress relaxation. Short term load behavior: tensile, flexural, and shear. Long term load behavior: creep, stress relaxation and fatigue. High speed property: impact, frictional loading and erosion. Weathering: stress cracking and aging. Plastics processing: injection molding, extrusion, blow molding and thermoforming. Product design feature: pseudo elastic design, shrinkage, weld line, residual stress and stress concentration. Injection molding: material, process, product design, mold design and mold filling and computer aided analysis. Fiber reinforced plastics: materials, compounding, part design and performance.

Textbooks:

- [1] V. Rosato Dominick, V. Rosato Donald, and G. Rosato Marlene, *Plastics Design Handbook*.Kluwer Academic Publishers, 2000.
- [2] Tim A. Osswald and Georg Menges, *Materials Science of Polymers for Engineers*, Hanser Gardner Publications, 2003.
- [3] J.P. Beaumont, R. Nagel, and R. Sherman, *Successful Injection Molding: Process, Design and Simulation.* Hanser Gardner Publishers, 2002.

References:

- [1] Vishu Sha, Handbook of Plastics Technology, John Wiley Sons, 1998
- [2] F.W. Billmeyer Text Book of Polymer Science, Wiley Interscience, 2003
- [3] K.P.Menard, *Dynamic Mechanical Analysis: A Practical Introduction*, CRC Press, 1999.
- [4] D.W Clegg and A.A. Collyer, Mechanical Properties of Reinforced Thermoplastics, Elsevier Applied Science Publishers, 1986.