

UCH842 NANOFUID ENGINEERING

L	T	P	Cr
3	0	0	3.0

Introduction: Fundamentals of cooling, Fundamentals of nanofluids, Development of nanofluids, Experimental discoveries, Mechanisms and models for enhanced thermal transport.

Synthesis of Nanofluids: General issues of concern, Synthetic methods: Common issues of concern, Variety in nanomaterials, Microemulsion-based methods for nanofluids, Solvothermal synthesis, Synthesis using supports, Magnetic nanofluids, Inert gas condensation, Anisotropic nanoparticles, Other nanofluids.

Conduction Heat Transfer in Nanofluids: Conduction heat transfer, Measurement of thermal conductivity of liquids, Thermal conductivity of oxide nanofluids, Temperature dependence of thermal conductivity enhancement, Metallic nanofluids, Nanofluids with carbon nanotubes.

Theoretical Modeling of Thermal Conductivity in Nanofluids: Simple mixture rules, Maxwell's approach, Particle distributions, Particle geometries, Symmetrical equivalent medium theory, Matrix-particle interfacial effects, Interfacial thermal resistance, Dynamic models of thermal conductivity in nanofluids, Near-field radiation model.

Convection in Nanofluids: Fundamentals of convective heat transfer, Convection in suspensions and slurries, Convection in nanofluids, Analysis of convection in nanofluids, Numerical studies of convection in nanofluids, Convective simulation for chip cooling application.

Boiling of Nanofluids: Fundamentals of boiling, Pool boiling of nanofluids, Critical heat flux in pool boiling of nanofluids, Other investigations related to boiling of nanofluids.

Applications and Future Directions: Applications of nanofluids, Liquid cooling, Tribological applications, Biomedical applications, other potential applications, Applied research in nanofluids.

Text Books:

1. Das, S. K., Choi, S. U. S., Yu, W., and Pradeep, T., Nanofluids, John Wiley & Sons (2008).
2. Surya Kumar Saripella, Nanofluid heat transfer enhancement in engineering applications, University of Illinois at Urbana-Champaign (2007).

Reference Books:

1. Wilson, M., Kannangara ,K., Smith, G., and Simmons, M., Nanotechnology: Basic Science and Emerging Technology, Chapman & Hall (2004).
2. Liqiu Wang, Advances in Transport Phenomena, Springer (2009).

Evaluation Scheme:

S. No.	Evaluation Elements	Weightage (%)
1	MST	30
2	EST	50
3	Sessional (may includes assignments/ quiz's etc)	20