

## UCH842 NANOFLUID ENGINEERING

<b>L</b>	<b>T</b>	<b>P</b>	<b>Cr</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3.0</b>

**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).