MECHANICAL ENGINEERING

Micro & Nano Scale Energy Transport

Type of Course	:	New
Course Snapshot	:	Elective / PG
	:	PG students of M.E,Chemical Biotech
Pre-requisites	:	Undergraduate Thermodynamics, fluid mechanics and Heat Transfer
Course Duration	:	30 hours / 12 weeks
Industry Support	:	Companies working in the areas of nano technology such as Intel, IBM etc

COURSE OUTLINE:

This course will address the fundamentals of Micro and Nano scale transport in various fields of current interest such as thermal dissipation from electronic devices, thermoelectric energy conversion devices and Micro electro mechanical systems and sensors (MEMS). Students from diverse backgrounds such as Mechanical, Aerospace, and Electrical engineering as well as from physical sciences may find this course useful.

INSTRUCTOR:

Prof. Arvind Pattamatta
Department of Mechanical Engineering
IIT Madras

ABOUT INSTRUCTOR:

Prof. Arvind Pattamatta is as an Associate professor in the Department of Mechanical Engineering at Indian Institute of Technology Madras. He received his Doctoral degrees in Aerospace Engineering from the State University of New York at Buffalo. From 2003 till 2005, he was employed as a Design Engineer in the Combustion Center of Excellence at GE India Technology Center in Bangalore, India where he was using Computational Fluid Dynamics based tools for the analysis of fluid flow and heat transfer in GE Aircraft engine Combustion chambers.

COURSE PLAN:

Week 1 : Introduction to micro/nano scale energy transport
Week 2 : Fundamentals of Quantum Mechanics
Week 3 : Fundamentals of Quantum Mechanics
Week 4 : Fundamentals of solid state physics
Week 5 : Fundamentals of Statistical Thermodynamics
Week 6 : Fundamentals of Statistical Thermodynamics
Week 7 : Nanoscale Transport Processes
Week 8 : Nanoscale Transport Processes
Week 9 : Micro scale Transport in Single Phase Fluids
Week 10 : Phase change in micro/nano channels
Week 11 : Nanofluids
Week 12 : Applications of microfluidics and nanofluidics