Introduction to Thermal System Design

The design of thermal systems requires an integrated approach that treats thermodynamics, fluid mechanics, and heat transfer as parts of one interconnected area, in which appropriate solutions to real-life design and analysis problems can be obtained only when all these aspects are considered simultaneously (after familiarity with these three topics is achieved in previous dedicated courses.) This approach must be implemented through open-ended problems and design project-oriented teaching. Topics related to thermal systems include fluid flow networks, heat exchanger design, design and selection of pumps, fans and compressors, heat recovery systems, psychrometrics, air-conditioning systems, electronic cooling systems, fuels and combustion, solar thermal systems, and power plant design. This course is specifically designed to allay the fear of ill-defined problems by teaching the skills to model and translate a physical situation into the relevant equations. The use of equation-solving software facilitates the implementation of this focus by reducing the effort involved in solving equations and affording the opportunity for more discourse on the approach toward modeling of thermal systems. The students will learn the effect of individual component design on overall systems through parametric optimization studies.

Topics common to the design of all thermal systems will be taught briefly in an interactive lecture format, but the main emphasis will be on open-ended design problems to be formulated and solved in discussion format. The course will begin with the development of skills for the modeling and parametric investigation of individual thermal system components. As proficiency is gained in these exercises, the students will develop the capability to design overall thermal systems in projects of larger scope. The methodology of translating a problem statement into design tasks and executing them will be illustrated. The understanding of thermal component and system design will be encouraged by requiring the students to view the "solution" to the problem as the beginning rather than the end of a design. Discussion of the effects of changes in design conditions (flow rates, inlet temperatures, etc.) and component geometry (diameter, length, other features) on performance will be emphasized.

Modules	Introduction to thermal energy systems : September 11th – 15th, 2017 Number of participants for the course will be limited to fifty.
You Should Attend If…	➢ Senior undergraduates, M.Tech./M.Sc students. A basic background in thermodynamics, fluid dynamics and heat transfer is assumed. ➢ B.Tech/B.Sc. and M.Tech/M.Sc level teachers engaged in teaching thermal sciences courses. ➢ Executives, engineers and researchers from industry, service and government organizations including R&D laboratories who are engaged in thermal management problems.
Fees	The participation fees for taking the course is as follows: Students (UG/PG): INR 5000/- Research Scholars: INR 8000/- Faculty Members: INR 12000/- Foreigners: USD 300 Industry and Others: INR 15000/- The above fees include all instructional materials, tutorials and assignments, 24 hrs free internet facility.
Accommodation	Paid accommodation will be provided to participants on first-come-first-serve basis.

The Faculty

Prof. Srinivas Garimella is the Hightower Chair in Engineering and Director of the Sustainable Thermal Systems Laboratory at Georgia Institute of Technology. He received a Ph.D. degree (1990) and an M. S. degree in Nuclear Engineering from The Ohio State University. He received a Bachelor's degree in Mechanical Engineering from The Indian Institute of Technology, Kanpur (India) in 1982. He conducts research in areas ranging from fundamental investigations of phase-change heat and mass transfer and supercritical fluid flow and heat transfer phenomena in single- and multi-component fluids at the micro- and mini-scales to the development of novel thermally activated absorption and vapor compression heat pumps, natural refrigerant space-conditioning systems, thermal management systems for high density Lithium-Ion batteries in vehicular applications, waste heat recovery for high flux, low temperature cooling in naval and refrigerated transport applications, miniaturized wearable and portable cooling systems, adsorption based carbon capture and gas cleaning, and waterless power plant condenser cooling. Integrated experimental, analytical, and computational approaches have led to the direct implementation of insights from the fundamental investigations of heat and mass transfer into practical thermal systems and components with lower energy utilization and environmental impact.

Dr. E. Anil Kumar is an Associate Professor in the Discipline of Mechanical Engineering, IIT Indore. He obtained his Ph.D. Degree from the Department of Mechanical Engineering, IIT Madras. His research interests are measurement of Thermodynamic and Thermophysical properties of solid state hydrogen storage materials, Carbon dioxide capture and sequestration. He has published more than fifty papers in peer reviewed International Journals and Proceedings of International and National Conferences.

Course Co-ordinator

For any information regarding eligibility fee payment, travel information, accommodation, etc., please contact the course coordinator via e-mail or phone

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