**HEAT EXCHANGERS: FUNDAMENTALS AND DESIGN ANALYSIS**

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**COURSE OUTLINE:**

Heat exchangers are extensively used in diverse industries covering power generation, refrigeration and air conditioning, cryogenics, oil refineries and chemical processes, automobiles and other transport devices. The performance of a heat exchanger is very important for the conservation of energy, assurance of product quality, process viability and environmental protection. The present course aims at developing a familiarity with various types of heat exchangers, their construction and applications. Conventional methods of heat exchanger analysis; brief design methodology of typical heat exchangers and synthesis of heat exchanger network. It is planned to develop an appreciation and basic expertise in heat exchanger through description, mathematical analysis and numerical examples.

**ABOUT INSTRUCTOR:**

Prof. Prasanta Kumar Das is a Professor of Mechanical Engineering and presently the Dean Post Graduate Studies and Research at IIT Kharagpur. He possesses a vast experience in teaching and research. His research interests lie in the broad area of thermal engineering with a special emphasis on two phase flow.

Prof. Indranil Ghosh received his B. Sc. and M. Sc. in Physics from Jadavpur University in 1990 and 1992 respectively, M.Tech and Ph.D. from the Cryogenic Engineering Centre, Indian Institute of Technology, Kharagpur in 1995 and 2005 respectively.

**COURSE PLAN:**

**TYPE OF COURSE** : Rerun | Core/Elective | UG/PG  
**INTENDED AUDIENCE** : B.E/B.Tech, M.E/M.Tech, Ph.D  
**PRE-REQUISITES** : Basis knowledge of Statistical Mechanics  
**COURSE DURATION** : 12 weeks (20 Jul’20 - 09 Oct’20)  
**EXAM DATE** : 17 Oct 2020  

*Background, Application, Classification, Common terminologies*

*Introduction to Thermal and hydraulic aspects, pressure drop and heat transfer, sizing and rating. F-LMTD and -NTU method.*

*Tubular Heat Exchangers: different designs, brief description of Shell and Tube Heat Exchangers, Special types.*

*Compact heat exchangers, enhancement of heat transfer, extended surface or Fin, fundamental of extended surface heat transfer, Fin tube heat exchanger.*

*Plate Fin Heat Exchangers (PFHE), types, construction, fabrication, design, application. Multistream PFHE.*

*Multistream PFHE continued. Direct contact heat exchangers, types, application, simple analysis.*

*Regenerators, types of regenerators, construction, application. Theory of Regenerator, NTU and method.*

*Heat pipes, construction, working principle, application, analysis. Special heat pipes.*

*Microscale Heat Exchangers and heat sinks; heat transfer and fluid flow through narrow conduits, special design considerations.*

*Phase change HEX; phase change heat transfer, introduction to evaporators and condensers.*

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*Heat Exchanger testing, steady state and dynamic methods.*