

MAE 4347/5347: Heat Exchanger Design

Elective Course

Course description: This is an advanced level course covering applied aspects of heat transfer.

Prerequisites: Thermodynamics, heat transfer and fluid flow. Knowledge of boiling and two-phase flow will be a plus.

Textbook: Instructor's Notes

Supplemental Reading:

Heat Exchanger Design by Arthur Fraas, ISBN 0-471-62868-9

Shell and Tube Heat Exchangers by Stanley Yokell, ISBN 0-07-072281-1

Heat Transfer by Donald Kern

Heat Exchanger Design by Sadic Kakac and Hongtan Liu, ISBN 0-8493-1688-X

Heat Exchangers by E.A.D. Saunders, ISBN 0-470-20870-8

Convective Boiling and Condensation by John Collier, ISBN 07-011798-5

Course objectives: To understand the fundamentals of heat exchangers and introduce them to detailed design aspects of shell and tube and plate heat exchangers. The design deals with in-depth issues about thermo-fluid aspects of single and two phase flows. The course also covers introduction to construction and prevalent international codes such as ASME Section VIII, Div. 1. At the end of the course each student should be able to design optimized heat exchangers for basic refrigeration and/or industrial applications.

Topics covered:

Fundamentals of Heat Transfer and Fluid Flow: Conduction, Convection, Boiling

Construction of Shell and Tube Heat Exchangers

Construction of Plate Heat Exchangers

Mean Temperature Difference

Sensible Heat Transfer: Design of Fluid to Fluid Heat Transfer Equipment

Condensing Heat Transfer: Design of Condensers with Gravity and Vapor Shear

Boiling Heat Transfer: Design of Flooded, DX and Spray Evaporators

Design of Plate and Frame Exchangers

Codes and Standards

Contribution of course to meeting the professional component: Three hours of engineering topics.

Prepared by: Zahid Ayub

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