# PROCESS EQUIPMENT DESIGN

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**TYPE OF COURSE :** Rerun | Core | UG
**COURSE DURATION :** 12 Weeks (24 Jan' 22 - 15 Apr' 22)
**EXAM DATE :** 23 Apr 2022

**PRE-REQUISITES :** Basic knowledge of Heat Transfer and Mass transfer

**INTENDED AUDIENCE :** Undergraduate students of Chemical Engineering. However, this course will also be helpful for those who have substantial industrial experience while working in chemical processes and designing process equipment.

**INDUSTRIES APPLICABLE TO :** Any chemical process plant

**COURSE OUTLINE :**
Chemical process plants include a number of important equipment such as reactors, distillation columns, absorbers, heat exchangers, evaporators, crystallizers, etc. Design of such equipment should be carried out a priory to set-up a process plant and thus, it is the basic step in a chemical process. The present course enables one to learn about the complete process design of Heat Exchanger, Condenser, Reboiler, Crystallizer, Evaporator, Packed column and Distillation column. Further, mechanical design of distillation column is also illustrated in this course.

**ABOUT INSTRUCTOR :**
Prof. Shabina Khanam is working as Associate Professor in Chemical Engineering Department of IIT Roorkee. She has completed B.Tech degree from AMU Aligarh, Aligarh in 2000 and M.Tech and Ph.D. degree from IIT Roorkee in 2002 and 2007, respectively. Her major fields of study are Process Integration, Energy and Mass Conservation and Modeling and Simulation of Chemical Processes. She has almost 9 years experience in teaching and research. During this period she has supervised 7 Ph.D. and 24 M.Tech. theses. At present 1 Ph.D and 1 M.Tech theses are in pipe line. She has published 35 and 29 research papers in different refereed journals and conferences, respectively. She has taught the proposed course seven times in her 13 years teaching career.

**COURSE PLAN :**

**Week** 1**:** Introduction, Classification of exchangers-1, Classification of exchangers-2, Basic design parameters-1, Basic design parameters-2

**Week** 2**:** Double pipe exchanger-1, Double pipe exchanger-2, Double pipe exchanger-3, Types of Shell and Tube exchangers (S&TE), Tubes and Shell-1

**Week** 3**:** Tubes and Shell-2, S&TE design-Kerns method-1, S&TE design-Kerns method-2, S&TE design-Kerns method-3, S&TE design-Kerns method-4

**Week** 4**:** S&TE design-Kerns method-5, S&TE design-Bells method-1, S&TE design-Bells method-2, S&TE design-Bells method-3, S&TE design-Bells method-4

**Week** 5**:** S&TE design-Bells method-5, Condenser design-1, Condenser design-2, Condenser design-3, Condenser design-4

**Week** 6**:** Condenser design-5, Reboiler design-1, Reboiler design-2, Reboiler design-3, Reboiler design-4

**Week** 7**:** Reboiler design-5, Reboiler design-6, Reboiler design-7, Evaporator design-1, Evaporator design-2

**Week** 8**:** Evaporator design-3, Evaporator design-4, Evaporator design-5, Crystallizer design-1, Crystallizer design-2

**Week** 9**:** Crystallizer design-3, Crystallizer design-4, Packed column design-1, Packed column design-2, Packed column design-3

**Week** 10**:** Packed column design-4, Distillation column (process design)-1, Distillation column (process design)-2, Distillation column (process design)-3, Distillation column (process design)-4

**Week** 11**:** Distillation column (process design)-5, Distillation column (process design)-6, Distillation column (process design)-7, Distillation column (mechanical design)-1, Distillation column (mechanical design)-2

**Week** 12**:** Distillation column (mechanical design)-3, Distillation column (mechanical design)-4, Distillation column (mechanical design)-5, Distillation column (mechanical design)-6, Distillation column (mechanical design)-7