



# EQUIPMENT DESIGN : MECHANICAL ASPECTS

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

**INDUSTRY SUPPORT :** 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 priori to set-up a process plant and thus, it is basic step in a chemical process. Mechanical design of equipment addresses the stress and strain produced in different parts of the equipment such as shell, head, support, etc. due to operating conditions of the process. The success and failure of the process depends on how perfectly stress and strain are considered while designing. Thus, the present course enables one to learn about the mechanical design of chemical process equipment.

### 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 Management and Modeling and Simulation. She has almost 9 years of experience in teaching and research. During this period she has supervised 1 Ph.D. and 14 M.Tech theses. At present 6 Ph.D and 3 M.Tech theses are in pipe line. She has published 29 and 24 research papers in different refereed journals and conferences, respectively. She has taught the course Mechanical Operations six times in her 9 years of teaching career.

### COURSE PLAN :

**Week 1:** Introduction, Stress and Strain Relationship, Terminologies, Design of Shell

**Week 2:** Design of Heads, Compensation for Opening

**Week 3:** L/D ratio of vessel, Design of Flanges

**Week 4:** Design of Support, Vessel under external pressure, Vessel under very high pressure