

Second level degree in Chemical Engineering

Faculty of Engineering of Industrial Processes

CONCEPTUAL DESIGN AND COST ANALYSIS

prof. Davide Manca

credits: 5

Course contents

Optimal Design of a Process (Conceptual Design)

Elements of conceptual design. Batch vs continuous processes. Process flow diagrams and PI&D diagrams. Economic potentials for the feasibility study of the process. Reacting systems. Separation systems. Heat exchanger networks. Pinch technology. The economic potential of level 2, 3, 4 and 5. Overview of process simulation software. Introduction to the plant-wide process control.

Reconciliation, Optimization and Supervision

Reconciliation of the process measures: classical approach and gross error detection. Model identification and coaptation. Design optimization and on-line optimization of the process. Objective function, equality and inequality constraints. Monodimensional and multidimensional optimization. Linear and non linear programming. The hierarchy of Control, Optimization and Supervision of processes.

Cost Analysis

Cash flow. Investment and Operating costs. Capital investment. Cost indexes. Loans and depreciation. Cost analysis of a whole process. Break-even point. Introduction to the feasibility study.

Suggested literature

- J. M. Douglas "Conceptual Design of Chemical Processes", McGraw-Hill (1988)
W. D. Seider, J. D. Seader, D. R. Lewin "Process Design Principles, Synthesis, Analysis and Evaluation", John Wiley & Sons, (1999)
R. Turton, R. C. Baille, W. B. Whiting, J. A. Shaeiwitz "Analysis, Synthesis and Design of Chemical Processes, Prentice Hall, (1998)
T. F. Edgar, D. M. Himmelblau "Optimization of Chemical Processes", McGraw-Hill, (1989)
M. S. Peters, K. D. Timmerhaus, R. E. West "Plant Design and Economics for Chemical Engineers", McGraw-Hill (2002)