**King Saud University- College of Engineering- Dept of Chemical Engineering**

**CHE 422: Selected Topics: Chemical Engineering Design Date**:5-5- 2017

|  |
| --- |
| **Prepared by**: Mohamed Asif, Mourad Boumaaza |
| **Total credits**: 3 | Lecture Cr: 3 | Lab Cr:  | Recitation Cr: 1 |
| **Pre Req(s): CHE 318 CHE317** | **Co Req(s):** | **Course designation:** Required |
|  |
| **Contribution to professional component**: |
| Math and Basic science Cr:  | Engineering Cr: 3 | General Education Cr:  |
|  |  |  |
| **Catalog Data:** Study of scientific strategies for the design of a complete chemical process plant through a design project. The project is carried out by a group of students (3-5). The Design concerns major equipment used in a chemical plant (Heat exchangers, separations process units, reactors) as well as carrying out a complete economical study of the project, applying a hazop analysis, and implementing a control study in the selected process.  |
| **Textbook:** Ray Sinnott, Cavin Towler Engineering design, 6th edition IchemE eDITION |

|  |
| --- |
| **Topics covered** |
| 1 Introduction to Hazop, Environment and safety aspects in the design of chemical plants2 Design of multi tubular heat exchanger without phase change: (Mechanical- thermal design)3 Design of condensers and boilers.4 Design of Furnaces3 Design of distillation columns4 Design of Absorbers5 Design of reactors6 Cost and Economics analysis of the plant design project7 Control engineering8 Introduction to Packages programs used in Engineering design (MATLAB- ASPEN) |
|
|
|

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **Course Objectives** | a | b | c | d | e | f | g | h | i | j | k |
| 1.Able to apply the skills build in previous courses to understand and read process flow diagram, use mass and energy balance to perform design calculation and to represent and interpret process data.  | 3 |  | 3 |  | 2 |  | 2 |  |  |  | 2 |
| 2.Able to apply principles of heat transfer to design optimal heat exchangers with and without phase change for specific duty.  | 3 |  | 2 |  | 1 |  |  |  |  |  | 2 |
| 3To be able to select and design best and appropriate separations equipment unit to perform required separation duty.  | 3 |  | 2 |  | 2 |  |  |  |  |  | 2 |
| 4.to be able to understand, select and design appropriate reactors required in specific process . | 3 |  | 3 |  | 2 |  |  |  |  |  | 1 |
| 5.Able to carry out an economic analysis of project and determine the main indicator parameters.(rate of return, payback period..) | 2 |  | 3 | 2 | 2 |  |  |  |  |  | 1 |
| 6.Understand how to implement an Hazop analysis and carry out environment and safety issues |  |  | 2 |  | 1 |  |  |  | 1 | 3 | 3 |
| 7.Teamwork: Work effectively in problem-solving teams both in and out of class, as well as learn to communicate (oral and written) . |  |  |  | 3 |  |  | 2 |  |  |  |  |

 **Class requirements:**

1. Homework assignments
2. Quizes
3. Design project (Report + oral presentation)
4. Final Exam

**Assessments of course goals:**

1. Homework 30%
2. Design project 30%
3. Final Exam 40%