ChE-413

Chemical engineering product design

Sivula Kevin

Cursus	Sem.	Type
Ing.-chim.	MA1, MA3	Obl.

Language of teaching	English
Credits	4
Session	Winter
Semester	Fall
Exam	During the semester
Workload	120h
Weeks	14
Hours	**4 weekly**
Project	4 weekly
Number of positions	

Summary

Chemical product design has become more important because of major changes in the chemical industry. This course presents the basic method for chemical product design and gives direct practice to this procedure via a design project.

Content

Exploration of a simplified 4 step process for chemical product design.

1. List the Needs of the product
    1. Categorize the needs as “Essential”, “Desirable” or “Useful”
    2. Convert vague or qualitative needs into quantitative specifications
2. Develop a list of 20-200 Ideas that could satisfy the needs of the project
    1. Sort these ideas into 4 or 5 broad approaches.
    2. Screen the ideas to identify the top ideas in each approach using quick calculations.
3. Select the best ideas for further development
    1. Using kinetic or thermodynamic analysis together with a selection matrix technique.
    2. Assess the risk with each of the top ideas.
4. Preparation for manufacture
    1. Evaluate economic potential of product
    2. Write an “executive summary” of a business plan.

Students will then apply this method to a specifc product design project led by a product design coach.

1.

Keywords

product design, chemical products

Learning Prerequisites

Required courses

none

Recommended courses

ChE 201 ChE 202 ChE 301 ChE 302 ChE 303 ChE 306 or equivalent are recommended

Important concepts to start the course

Basic chemistry and chemical engineering knowledge is required (Transport, Thermodynamics, Kinetics).

Learning Outcomes

By the end of the course, the student must be able to:

- Compose a list of needs for a chemical product
- Develop product needs into engineering specifications
- Synthesize ideas to satisfy product specifications
- Formalize a quantitative process to evaluate ideas
- Design a chemical product to meet specifications
- Manage design projects
- Present results to project supervisor

Transversal skills

- Assess progress against the plan, and adapt the plan as appropriate.
- Set objectives and design an action plan to reach those objectives.
- Negotiate effectively within the group.
- Communicate effectively with professionals from other disciplines.
- Make an oral presentation.
- Write a scientific or technical report.

Teaching methods

Lectures, Exercises and course project

Expected student activities

Attending lectures, Completeing exercises, and doing a project

Assessment methods

20% Exercises 80% Project

Resources

Bibliography

Chemical Product Design (Cambridge Series in Chemical Engineering)
by E. L. Cussler , G. D. Moggridge

Ressources en bibliothèque

- Chemical product design / Cussler