OBEM (Outcome-Based Module) for

CHE656: Process Analysis and Modeling

URL: https://support.leb2.kmutt.ac.th/hc/en-us/articles/900001790526-What-Is-OBEM-and-How-to-Operate-It-Using-LEB2

The CHE656 course has the following 5 learning outcome modules:

Module 1: Core Technical Competency in Modeling and Using MATLAB Built-in Solvers

In this module, students need to master the skills of developing mathematical models for chemical processes/systems, which are then solved analytically by hand or using MATLAB built-in solvers.

Learning activities:
- Lectures with plenty of examples
- Three assigned homework sets and one in-class tutorials

Assessment methods:
- Graded homework and tutorials
- Midterm exam

Rubric:

- Level 1 – Scores less than 60% on homework/tutorials and less than 20% on the Midterm
- Level 2 – Scores between 60-70% on homework/tutorials and between 20-30% on the Midterm
- Level 3 – Scores between 70-80% on homework/tutorials and less than 30-40% on the Midterm
- Level 4 – Scores less than 80-90% on homework/tutorials and less than 40-50% on the Midterm
- Level 5 – Scores above 90% on homework/tutorials and more than 50% on the Midterm

Students pass Module 1 if they attain either Level 4 or Level 5 in the Rubric.

Module 2: Core Technical Competency in the Fundamentals of Optimization

In this module, students learn to understand the basic principles of optimization and master the skills of developing mathematical models (called programming formulations) in the optimization of chemical processes/systems, which are then solved analytically by hand or using MATLAB built-in solvers.

Learning activities:
- Lectures with plenty of examples

- Five assigned homework sets and one in-class tutorials

Assessment methods:
- Graded homework and tutorials
- Final exam

Rubric:

- Level 1 – Scores less than 60% on homework/tutorials and less than 20% on the Final Exam
- Level 2 – Scores between 60-70% on homework/tutorials and between 20-30% on the Final Exam
- Level 3 – Scores between 70-80% on homework/tutorials and less than 30-40% on the Final Exam
- Level 4 – Scores less than 80-90% on homework/tutorials and less than 40-50% on the Final Exam
- Level 5 – Scores above 90% on homework/tutorials and more than 50% on the Final Exam

Students pass Module 2 if they attain either Level 4 or Level 5 in the Rubric.

Module 3: Development of Soft Skills and Problem-solving skills via PBL or Design Projects

In this module, students will be trained to acquire soft skills and problem-solving skills via design projects:
1. Critical and problem-solving skills
2. Oral presentation in the form of 5 scheduled presentations
3. Presentation slides and technical writing in the form of a final report

The 3 sets of skill can be classified as learning sub-modules as follows:

Module 3.1: Critical and problem-solving skills

Learning activities:
- Study given problem statement of the design projects and assigned papers
- Search the Internet for additional information and related papers
- Use process simulator ASPEN Plus or perform coding in MATLAB

Assessment methods:
- Via technical contents and accuracy in the oral presentations
- Via a final report

Module 3.2: Oral presentation

Learning activities:

- Presentation rehearsals with the assigned advisor
- A total of 5 oral presentations spread over a period of 4 months

Assessment method:

- Evaluations by a panel of 3 "judges" from the ChEPS program for the 5 presentations

Module 3.3: Presentation Slides and Technical Writing

Learning activities:

- Summarize major findings of related papers/references in the form of a report
- Submit presentation slides for all 5 presentations
- Submit a series of technical reports, including a proposal, a progress, and a final report

Assessment methods:

- Via a final report submitted to the ChEPS program

Rubric:

- Level 1 – Scores less than 50% on all assessment methods
- Level 2 – Scores between 50-60% on all assessment methods
- Level 3 – Scores between 60-70% on all assessment methods
- Level 4 – Scores less than 70-80% on all assessment methods
- Level 5 – Scores above 80% on all assessment methods

Students pass Module 3 if they attain either Level 4 or Level 5 in the Rubric.