

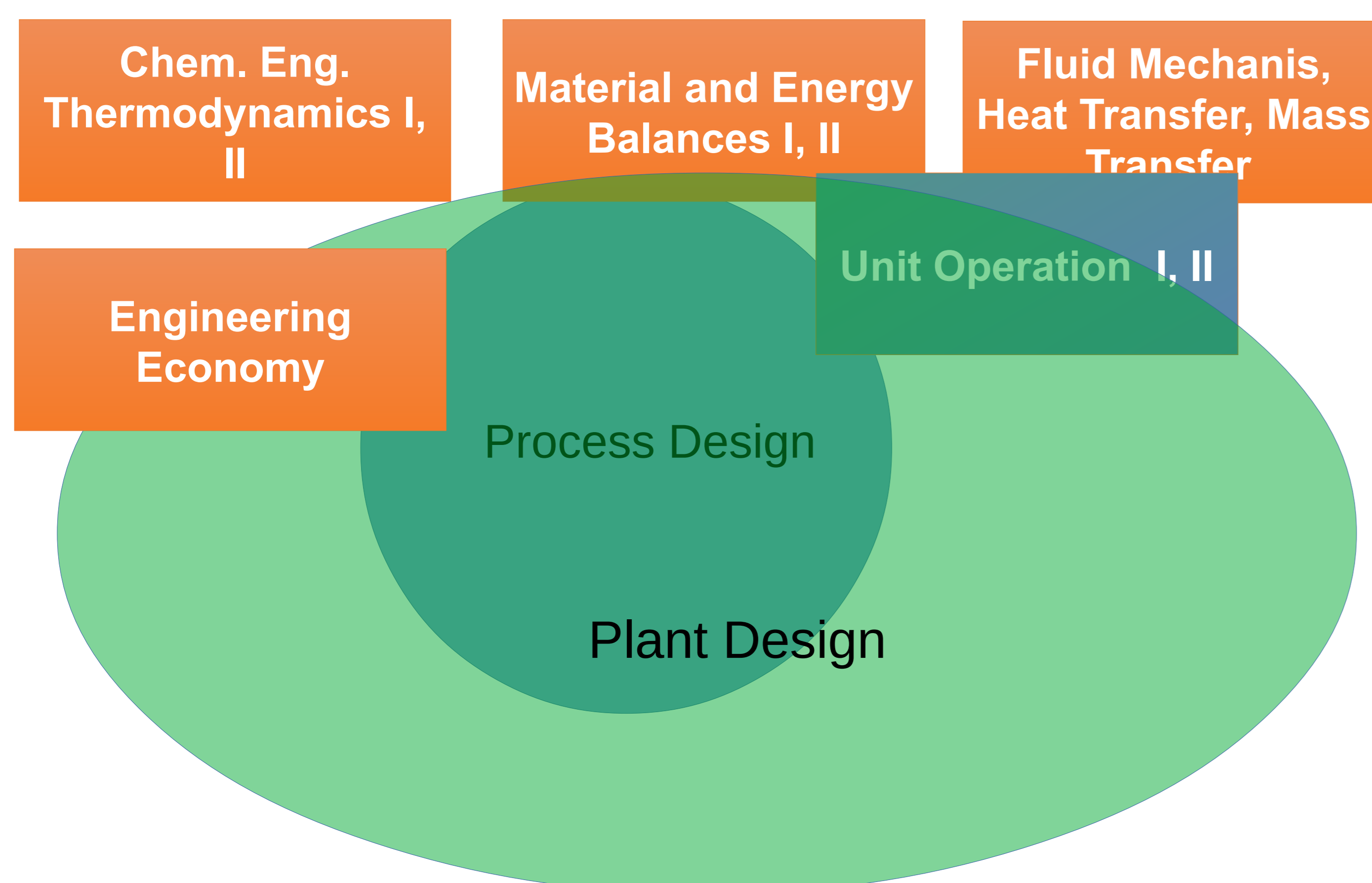


Modular Contents, Simulation and Open-Ended Problems in Process and Plant Design

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Overview

In traditional chemical engineering curriculum, *plant design* is a capstone subject which integrates all chemical engineering fundamentals as well as management into it to come up with a proper design of industrial plant. So the students need to acquaint with at least the following subjects



Problems Found

- Content redundancy
- Can not cover essential components (not enough time)
- Learning continuity disrupted
- Need a lot of contact hours
- Students are not very critical and not creative
- Students look at design problems as standard methods of calculation

Reasons

- Departmentalization of subjects
- Each subject tries to be self-contained
- Based on standard textbooks
- Wasting time in building up essential background
- Students not familiar with complex/integrated Problems
- Confined by methods in textbooks

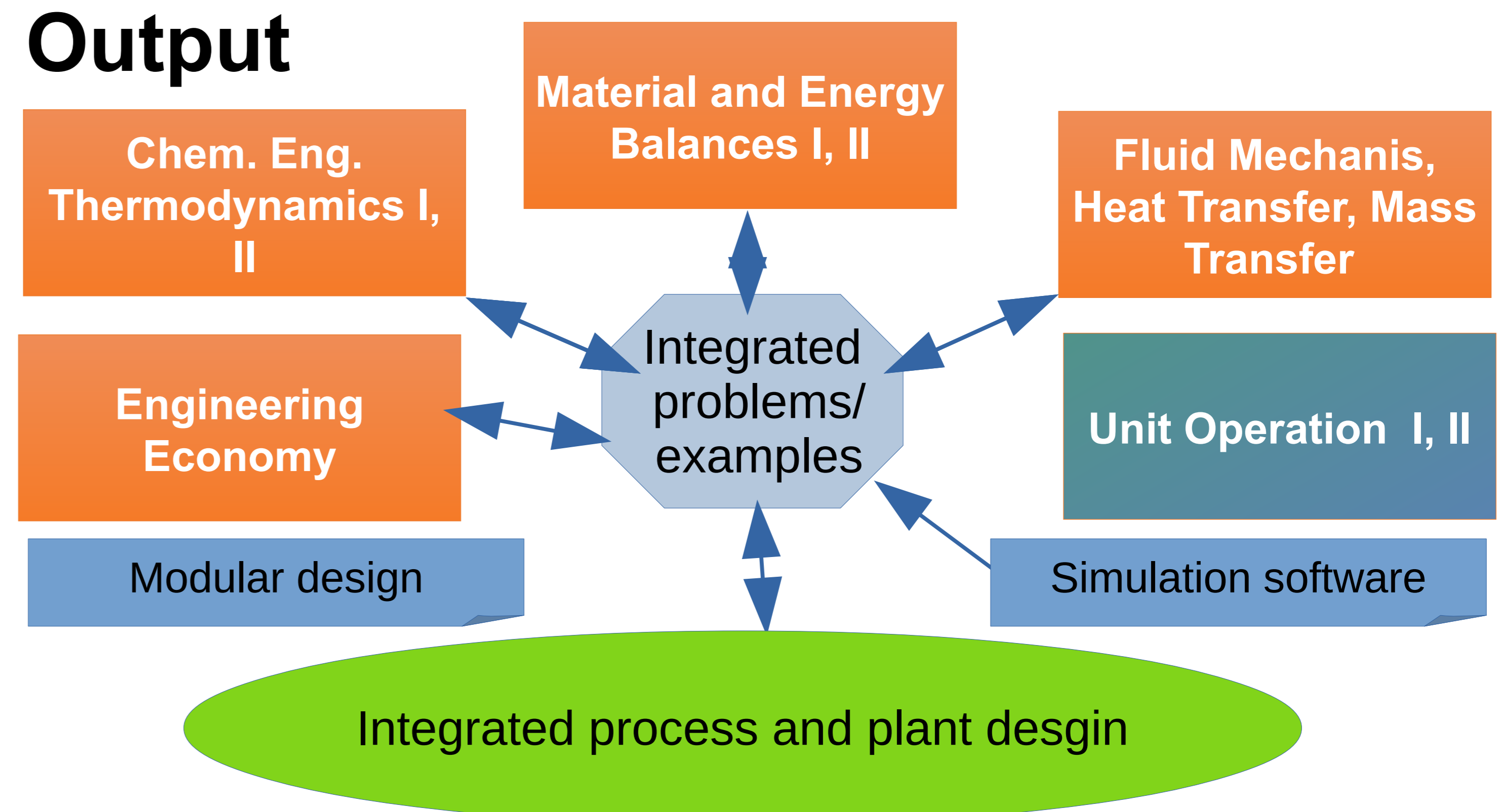
Aims and objectives

- Foster critical and creative thinking
- Reduce content overlapping and time to grasp the essential concepts of process and plant design
- Reduce contact hours while improve learning outcome
- Students are familiar with industrial software for modeling, simulation, process and plant design
- Graduates are more well-prepared for working in industrial environments

Concepts and Solutions

- Consider all related subjects as one and integrate learning contents and outcomes
- Define desired outcomes which can be achieved with 4 weeks and design the content to obtain the specified outcome in modular manner (while keep in mind that knowledge is integrated)
- Introducing optional complex problems in fundamental courses at the end of each subject. Simulation software is used intensively in all subjects.
- Use open-ended problem-based learning to activate critical and creative thinking particularly in process and plant design subjects.
- Integrate process design and plant design such that continuity is ensured, minimum content redundancy and move toward single, unified goal.

Output



Impact

- Minimum content redundancy and maximum continuity
- Improved critical and creative thinking
- Can cover all essential contents and expertise
- Students become more-independent learners

Future development of project

- Extend application of modular approach for all subjects In chemical engineering curriculum
- Integrate more software tools in learning and class management

References

- [1] J. P. Abulencia and L. Theodore, Open-Ended Problems: A Future Chemical Engineering Education, 2015.
- [2] J. Haydary, Chemical Process Design and Simulation: Aspen Plus and Aspen Hysys Applications, 2016.