

Advanced Chemical Reaction Engineering

2 units (selection)

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Target This class introduces the most up-to-date analytical procedures of catalysts together with the optimization techniques that can be used for determining the optimal design and operating conditions of chemical processes.

Outline The recent characterization techniques of catalysts such as XAFS and solid state NMR will be explained. Furthermore, basics of chemical reactor and process design and operation will be introduced using a chemical reaction process as an example.

Style Lecture

Keyword *catalyst, reactor, process design, optimization, reaction engineering*

Fundamental Lecture “Differential Equations”(0.2), “Chemical Reaction Engineering”(0.8), “Quantum mechanics and advanced lecture in quantum physics”(0.4)

Relational Lecture “Advanced Materials Science”(0.2), “Advanced Separation Technology”(0.2)

Requirement Students are required to have a good understanding of chemical engineering and related subjects in an undergraduate course.

Notice Preparations for lessons review will be needed.

Goal

1. To understand the advanced analytical procedures such as XAFS and solid state NMR from 1st to 7th.
2. To understand several basic optimization techniques for chemical processes from 8th to 15th.

Schedule

1. XAFS (1) : Introduction
2. XAFS (2) : Transmission mode
3. XAFS (3) : Fluorescence mode
4. XAFS (4) : Case study
5. Solid state NMR (1) : Introduction
6. Solid state NMR (2) : CP MAS
7. Solid state NMR (3) : Case study

8. Introduction to optimization problem

9. Linear programming

10. Nonlinear programming

11. Steepest descent method and line search

12. Integer programming problem

13. pinch technology

14. Process design exercise

15. Recent topics on process optimization

Evaluation Criteria Assignments count 100%.

Textbook All lecture documents will be opened through U-learning system.

Contents <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=216588>

Student Able to be taken by only specified class(es)

Contact

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MAIL (Office Hour: 月曜, 火曜, 16時から18時の間. また, 随時対応します .)

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