Automatic Control

2 units (selection)

Ken-Ichiro Sotowa · Associate Professor / Chemical Process Engineering, Department of Chemical Science and Technology

Target〉 To understand the role of automatic control in chemical processes. To learn how to analyze process dynamics using mathematical techniques such as calculus and Laplace transforms. The basic techniques to design control systems will be outlined.

Outline〉 Automatic control is widely applied to chemical processes. It is a vitally important technique to ensure safe and cost-effective operation of chemical plants. To design a good control system, it is necessary to fully understand the dynamics of the plant. This class introduces techniques to model process dynamics using differential equations, analysis techniques using Laplace transform and some basic methods to design control systems.

Keyword〉 ***control, Laplace transform, frequency response***

Fundamental Lecture〉 "**Differential Equations (I)**"(1.0), "**Chemical Engineering Principles**"(1.0), "**Introduction to Chemical Reaction Engineering**" (0.5)

Relational Lecture〉 "**Chemical Process Design**"(0.5)

Requirement〉 The audiences are required to have an understanding of the contents of differential equation 1.

Notice〉 Since Laplace transform is very important in understanding automatic control, the basics of the Laplace transform will be explained in the class. If you encouter any small questions, contact the lecturer without hesitation.

Goal〉 Understand the objective and basic principle of automatic control and learn basics to analyze and design control systems.

Schedule〉

1. Introduction to automatic control
2. Basics of process modelling
3. Application of process modelling
4. Basics of Laplace transform
5. Properties of Laplace transforms
6. Definition of transfer functions
7. Transfer function and dynamics
8. Block diagram
9. Frequency response
10. Bode diagram
11. Introduction to stability
12. Stability analysis
13. Bacis of control system design
14. Various control techniques
15. Topics of automatic control
16. Examination

Evaluation Criteria〉 There is a minitest each week. Overall minitest counts sum up to 30%. The final term examination counts 70%. Students gained over 60% will pass.

Relation to Goal〉 本学科学習・教育目標 (B:◎), (C:○) に対応する.

Textbook〉 Soeda and Nakamizo, Jidoseigyo no kiso to enshu, Nisshin shuppan

Reference〉 Appropriate materials will be introduced in the class.

Webpage〉 http://150.59.36.202/

Contents〉 http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=215962

Student〉 Able to be taken by night course student of same department

Contact〉

⇒ Sotowa (Chemistry and biotechnology building, 307., sotowa@chem.tokushima-u.ac.jp) Mail (Office Hour: 16:00-17:00, Monday and Tuesday. (can be contacted whenever available))

Note〉 Students are encouraged to learn classes related to the basics of chemical engineering before taking this lecture