

Transport Phenomena

Syllabus Number

1B303

Special Subjects

Elective 2 credit

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1. Course Description

Learning the derivation of a basic differential equation from the shell balance for a small element, and the technique to evaluate phenomena in flow and heat transfer quantitatively. Group discussion is allowed when report is prepared at every exercise. In this lesson, we mainly acquire knowledge about DP1.

2. Course Objectives

The study of basics of the transfer of momentum, heat and mass.

3. Grading Policy

A total of 60% or more from the result of the exercise in every lecture and the total exercise is regarded as passing.

Reports on exercises from every lecture (80%), general exercises (20%)

4. Textbook and Reference

Textbook

nothing special.

5. Requirements (Assignments)

We will apply the contents of previous lectures often, please read and review essential points in the notes (30 minutes). Preparation for each lesson : Contents and amount of preparation will be advised in writing, etc. at the end of the last lesson.

6. Note

nothing special.

7. Schedule

- [1] Basics of transport phenomena (heat, mass, momentum)
- [2] Analogy and dimensionless number
- [3] Liquid film flow
- [4] Flow in pipe
- [5] Flow around object
- [6] Problem of steady state heat conduction (flat plate)
- [7] Problems of steady state heat conduction (cylinder)
- [8] Problems of steady state heat conduction (fins)
- [9] Unsteady thermal conductivity (semi-infinite object, flat plate)
- [10] Natural convection heat transfer
- [11] Forced convection heat transfer
- [12] Radiation heat transfer
- [13] Basic theory of heat exchanger
- [14] Design of heat exchanger
- [15] Total exercises and summary