

# Theory of Aerospace Propulsion1

Syllabus Number

2B201

Basic Major Subjects

Requisites 2 credit

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## 1. Course Description

At first, the basis of thermodynamics will be reviewed followed up by studying several kinds of engine cycles.

Then the methods of evaluating the in-flow and out-flow of the thermal energy to and from the engine-cycle and the calculation of thermal efficiency will be studied.

Students will acquire the knowledge and techniques for the calculation related to DP1 and DP2.

This lecture is taught by teachers with practical experience. The teacher has been involved in the rocket engine development work at a company. In class, explanation and discussion etc. will be held based on actual example and actual experiences at the company and topics at the site.

## 2. Course Objectives

As the basis to study the aero-propulsion systems such as Reciprocating engine, Turbo Jet engine, and Turbo Fan engine, this course aims that students will master the basic thermodynamics of the engine cycle and to calculate basic thermodynamical properties.

## 3. Grading Policy

Evaluation will be done referring regular test.

## 4. Textbook and Reference

Textbook

Takamoto Saito, Kazuhiro Hamaguchi, Koichi Hirata Hajimete manabu netsurikigaku Ohmsha

ISBN:978-4-274-08725-7

Reference

Supplementary materials will be presented by LMS.

## 5. Requirements(Assignments)

Preparation (about 1.5 hour);Please read the contents corresponding to each lesson of the text book. And understand formulas and try deriving those by yourselves. Also please summarize what you do not understand in a notebook and ask questions by writing on a paper to be distributed every lesson.

Review (about 1.5 hour); Supplementary materials and examples of answers to exercises will be presented by LMS so please use them for your review. And please solve the exercises at the end of the each chapter.

## 6. Note

## 7. Schedule

- [1] Chapter1 Thermal equipments and Thermodynamics
- [2] Chapter2 Heat energy utilization technology
- [3] Chapter1 and 2 Exercises
- [4] Chapter3 Thermal energy and work
- [5] Chapter4 Energy and state change (First law of thermodynamics)
- [6] Chapter4 Energy and state change (Second law of thermodynamics, Work)
- [7] Chapter4 Exercises for energy and state change
- [8] Chapter5 State change of ideal gas
- [9] Chapter5 Exercises for state change of ideal gas
- [10] Chapter6 Engine cycle; Carnot cycle
- [11] Chapter6 Engine cycle; Otto cycle and Diesel cycle
- [12] Chapter6 Engine cycle; Brayton cycle
- [13] Chapter6 Exercises for engine cycle
- [14] Chapter7 Conversion of thermal energy to kinetic energy
- [15] Chapter7 Exercises for conversion of thermal energy to kinetic energy