

Synthetic Mechanical Engineering

Syllabus Number

IJ303

Special Subjects

Elective 2 credit

TANUMA, Tadashi

1. Course Description

Students will study recent accomplishments, issues and design technology in mechanical engineering. Students will solve some typical design problems that mechanical engineers typically have to solve in actual daily operations. Students should find the guidance and data for solving the design problems in the lecture materials provided to present their own grounds to solve the problems. Furthermore, students will solve equations which they have introduced by themselves using their calculators and/or PCs, and will double-check their results using alternative solutions just like in the actual design processes. Through this series of lectures, students will acquire abilities to find, to analyze and to solve problems and technical communication skills. These technical abilities and skills are essential for students who wish to become expert engineers or researchers in this field. Students will be able to acquire the knowledge, skills, abilities and attitudes described in the diploma policy DP2 and DP3. Students will also study with an actual specific design project proactively using Project-based learning methodology (PBL).

2. Course Objectives

The goal of this course is to acquire the applicable skills necessary for you as a mechanical engineer in years to come. You will learn how to solve technical problems in research, development, design, manufacturing, operation, maintenance and other technical jobs of productions in mechanical engineering fields, using dynamics, mathematics and all mechanical engineering related sciences. At the same time, students will understand how mechanical engineering answers to the engineering demands on site of productions through actual examples. Students will also acquire the basic design skills they will need in their future jobs.

3. Grading Policy

Exercises will be graded and sample answers will be presented.

Grade points are evaluated using equally weighted exercise total point and final exam point.

4. Textbook and Reference

Textbook

Lecture materials will be provided online, e.g. LMS by the lecturer.

Reference

Japan Society of Mechanical Engineers Practical handbook of Mechanical Engineering 7th edition
ISBN978-4-88898-209-2 C3053 Japan Society of Mechanical Engineers

5. Requirements(Assignments)

Students are preparing each lecture in advance and need to review each lecture and exercise. Every preparation needs at least one hour and a half and every review needs at least one hour and a half. Students need to use their own calculator and/or PC for each exercise and final exam.

6. Note

Students need to use their own calculator for exercises of every class and final exam.

Students can see the lecture materials provided and own handwritten note books during each exercise and final exam.

7. Schedule

- | | |
|------|---|
| [1] | The lecture overview
The goal of Engineering, Mechanical Engineering and Design |
| [2] | Lecture and exercise
Minimum requirement Mathematics, Mechanics and Units for Mechanical Engineering |
| [3] | Lecture and exercise of strength of material for steam turbine design |
| [4] | Lecture and exercise of fluid dynamics and hydro turbine design |
| [5] | Lecture and exercise of vibration mechanics and generator rotor design |
| [6] | Introduction of design methodology |
| [7] | Applications of design methodology |
| [8] | Lecture and exercise of thermodynamics, aircraft engine and automotive engine designs |
| [9] | Lecture and exercise of aerodynamic designs for airplanes and automobiles |
| [10] | Introduction of design project methodology and management |
| [11] | Exercise of design project methodology and management |
| [12] | Fluid dynamics similarity rules and model tests for ship design |
| [13] | Lecture and exercise of home electric appliances: vacuum cleaner design |
| [14] | Exercise result evaluations and an overview of design methodology |
| [15] | Final exam and review |