

# Introduction to Mechatronics

Syllabus Number

1H202

Basic Major Subjects

Elective Requisites 2  
credit

AOKI, Akio

## 1. Course Description

The following contents will be learned.

- (1) Basic principle and basic structure of alternator and motor, magnetic circuits in transformer.
- (2) Theory of DC motor, starting method and speed control method.
- (3) Structure and principle of synchronous motor.
- (4) Structure and principle of induction motor.
- (5) Structure and principle of stepping motor.

In this lesson, knowledge, techniques, and attitudes regarding DP 2 will be acquired.

Lessons are primarily lecture-style, but pair work will be carried out as appropriate according to the context of each lesson.

## 2. Course Objectives

Students can apply basic knowledge of electricity, magnetism, and basic knowledge on electrical equipment and sensors to concrete examples in automobiles and the like.

## 3. Grading Policy

Your grade in the class will be decided on the evaluate with 100% of the result of the final exam. An explanation will be given after the end of the final exam.

## 4. Textbook and Reference

Textbook

Ebihara Daiki Electric Equipment Kyoritsu Shuppan Co., Ltd.

## 5. Requirements(Assignments)

- (1) As preparations for next lesson, please check the meaning of the proper noun and the contents of the relationship shown in the contents of the lesson, and come to the class. (90 minutes)
- (2) As a review, please solve exercises applied to the items instructed during the lesson, so that you can cope with works in pair as appropriate in the next lesson. (90 minutes)

## 6. Note

Classes are planned with a prerequisite the understanding of the contents of Principle of Electricity.

## 7. Schedule

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|------|---|
| [1]  | Basic principle of alternator.  |
| [2]  | Structure of alternator and armature reaction.  |
| [3]  | Transformer.  |
| [4]  | Magnetic circuits.  |
| [5]  | Various types of electric motor and its structure.  |
| [6]  | Theory of DC motor.   |
| [7]  | Excitation method and characteristics of DC motor.  |
| [8]  | Starting method of DC motor and speed control method.   |
| [9]  | Three-phase AC.   |
| [10] | Principle of rotating magnetic field by three-phase AC.                                       |
| [11] | Characteristics related to position and time axis by three-phase AC.                          |
| [12] | Relationship between composition of each phase and rotating magnetic field by three-phase AC. |
| [13] | Structure and principle of synchronous motor and structure and principle of induction motor.  |
| [14] | Principle of torque generation and excitation method of stepping motor.                       |
| [15] | Exercises in pairs and summary.   |