

Electronic Circuits 1

Syllabus Number

4D203

Special Subjects

Elective 2 credit

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1. Course Description

To understand the information processing equipment which convert information to electrical signals and communication equipment which transmit the signals, you will study the operation principles and the basic types of electronic circuits which consist of electronic devices such as diodes and transistors. This subject corresponds to the diploma policy DP4.

2. Course Objectives

According to DP4, our aim is the study the fundamental and important subjects concerning analog electronic circuit systems which are essential to electronic devices, such as basic semiconductor physics, operation principles of diodes and transistors, and transistor amplifier circuits which is a basic concept to design analog circuits. Students will be able to understand the fundamental knowledge and calculate exercises of the simple circuits.

3. Grading Policy

Students need to pass two reports in order to qualify for the final examination. The overall grade of this course will be decided based on the final examination. If the result of the final examination is 60 or more, you will pass.

Feedback will be given once the submitted reports are graded.

4. Textbook and Reference

Textbook

Hideyo Higuchi According to the themes in this course, the textbooks are as follows:

From class 1 to class 8: (Text 1) Reidai de manabu handoutai device nyumon, ISBN: 978-4-627-77411-7. Morikita publishing

Supervised by M. Iemura From class 9 to class 15: (Text 2) Nyu-mon densi-kairo for analog circuits, ISBN: 4-274-20317-4. Ohm-sha

Reference

Sub-textbooks are open to LMS. You should refer to the sub-textbooks. The sub-textbooks contain introduction of reference books.

5. Requirements(Assignments)

For preparations of each class, students must read and organize the contents, and must do the example questions in the relevant part of the textbook (about 1.0 hour).

For reviews of each class, students must finish the corresponding exercises on the textbook and the two reports (about 2.0 hour).

To understand the principles of semiconductor physics and devices, and the operation of transistor amplifier circuits, you must build up your fundamental knowledge by doing the exercises by yourself. You should proceed studying this course while checking your understanding by doing the exercises on the textbook and the two reports.

6. Note

To understand electronic circuits thoroughly, you must do the exercises. You should try other practices in addition to the two reports. If you need, you should review electrical circuits.

In succession, you should take "Electronic Circuits 2."

LMS will be used in this course.

7. Schedule

- [1] Introduction of semiconductor will be explained. The relevant parts of the textbook are Chapter 1 of Text 1 and Chapter 1 of Text 2.
- [2] The band structure of semiconductor will be explained. The relevant part of the textbook is Chapter 2 of Text 1.
- [3] The carrier of semiconductor will be explained. The relevant part of the textbook is Chapter 3 of Text 1.
- [4] The electrical conduction of semiconductor will be explained. The relevant part of the textbook is Chapter 4 of Text 1.
- [5] The p-n junction and the diodes will be explained. The relevant parts of the textbook are Secs. 5.1 to 5.4 of Text 1, and Secs. 2.1 to 2.3 of Text 2.
- [6] Various diodes will be explained. The relevant parts of the textbook are Secs. 5.5, 7.1 to 7.3 of Text 1, and Sec. 2.4 of Text 2.
- [7] Bipolar transistors will be explained. The relevant part of the textbook is Chapter 6 of Text 1.
- [8] Field effect transistors (FETs) will be explained. The relevant parts of the textbook are Secs. 7.4 to 7.8 and Chapter 8 of Text 1.
- [9] The outline of amplifier circuits will be explained. The relevant part of the textbook is Chapter 4 of Text 2.
- [10] Transistor amplifier circuits will be explained. The relevant part of the textbook is Chapter 4 of Text 2.
- [11] The bias circuits of transistor's circuit will be explained. The relevant part of the textbook is Chapter 5 of Text 2.
- [12] Equivalent circuits of transistor will be explained. The relevant part of the textbook is Chapter 6 of Text 2.

- [13] FET's amplifier circuits will be explained. The relevant part of the textbook is Chapter 8 of Text 2.
- [14] Multi-stage amplifier circuits will be explained. The relevant parts of the textbook are Secs. 6.4 and 7.5 of Text 2.
- [15] Power amplifier circuits will be explained. The relevant part of the textbook is Chapter 9 of Text 2.