| Akashi College | Year | 2023 | Course Title | Electrical and Electronic Measurement A |
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## Course Information

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| Course Code | 5230 | Course Category | Specialized / Compulsory |
| Class Format | Lecture | Credits | School Credit: 1 |
| Department | Electrical and Computer Engineering | Student Grade | 2nd |
| Term | First Semester | Classes per Week | 2 |
| Textbook and/or Teaching Materials | Shun Iwasaki:「Denjiki Keisoku」、Korona-sha | | |
| Instructor | HOSOKAWA Atsuishi | | |

## Course Objectives

1) Understand the concept of measurement.
2) Understand how to measure DC voltage, current, power, and resistance.

## Rubric

| | Ideal Level | Standard Level | Unacceptable Level |
|---|---|---|---|
| Achievement 1 | Can explain different measurement methods by giving specific examples. | Understand different measurement methods. | Do not fully understand different measurement methods well. |
| Achievement 2 | Can explain DC voltage, current, power, and resistance measurements by giving specific examples. | Understand how to measure DC voltage, current, power, and resistance. | Do not fully understand how to measure DC voltage, current, power, and resistance. |

## Assigned Department Objectives

## Teaching Method

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| Outline | The aim of this course is to understand the basic concepts of measuring operations and how to measure basic electrical phenomena. |
| Style | Classes are mainly conducted through note-taking. There will be handouts and references to the contents of the textbook as needed for explanations. In the lesson before each exam, there will be an exercise (quiz) on the content that will be on the exam. |
| Notice | Students must have a good understanding of Electrical Circuits I and II from their first and second year. In addition, they should apply the contents of the class to Experiments of Electrical and Computer Engineering I in the second semester of the second year.<br>Students who miss 1/4 or more of classes will not be eligible for a grade evaluation. |

## Characteristics of Class / Division in Learning

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| ☐ Active Learning | ☐ Aided by ICT | ☑ Applicable to Remote Class | ☐ Instructor Professionally Experienced |

## Course Plan

| | | | Theme | Goals |
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| 1st Semester | 1st Quarter | 1st | Measurement and instrumentation, direct measurement and indirect measurement | Understand the concept of measurement and the types of measurement methods (direct measurement and indirect measurement). |
| | | 2nd | Deflection method and null method | Understand the types of instrumentation methods (deflection method and null method). |
| | | 3rd | Types of errors, significant figures | Understand accuracy and error, and understand the concept of significant figures. |
| | | 4th | Propagation of error, units and standards | Can calculate measurement values taking into consideration the propagation of error, and understand the SI base units and derived units, and the relationship between standards (instruments) and traceability. |
| | | 5th | Analog indicating instruments | Understand the main configurations of analog indicating instruments. |
| | | 6th | Moving-coil instrument, electrodynamometer instrument | Understand the operating principles of indicating instruments (moving-coil instrument and electrodynamometer instrument). |
| | | 7th | Exercise on the content from weeks 1 to 6 | Understand the content from weeks 1 to 6 of the first semester. |
| | | 8th | Midterm exam | Understand the content from weeks 1 to 6 of the first semester. |
| | 2nd Quarter | 9th | Shunt, multiplier | Understand how to increase the rated values of currents and voltages using a shunt and multiplier. Understand the measurement of current and voltage using an indicating instrument. |
| | | 10th | Measurement of DC current and voltage, potentiometer | Understand the measurement of current and voltage using an indicating instrument. Also, understand the voltage measurement using a potentiometer. |
| | | 11th | Indirect measurement of DC power, DC power meter | Understand the indirect measurement of DC power using the voltmeter-ammeter method and the operating principle of a power meter. |
| | | 12th | Indirect measurement of resistance, Wheatstone Bridge | Understand the indirect measurement of resistance using the voltmeter-ammeter method and the measurement of resistance using Wheatstone Bridge. |

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| | | 13th | Ohmmeter | Understand the operating principles of ohmmeter. |
| | | 14th | Low resistance measurement, high resistance measurement of high resistance | Understand the issues involved in measuring low and high resistance and how to resolve them. |
| | | 15th | Exercise on the content from weeks 9 to 14 | Understand the content from weeks 9 to 14 of the first semester. |
| | | 16th | Final exam | Understand the content from weeks 9 to 14 of the first semester. |

Evaluation Method and Weight (%)

| | Examination | Exercise | Task | Total |
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| Subtotal | 70 | 30 | 0 | 100 |
| Basic Proficiency | 0 | 0 | 0 | 0 |
| Specialized Proficiency | 70 | 30 | 0 | 100 |
| Cross Area Proficiency | 0 | 0 | 0 | 0 |