| Akashi College |  | Year | 2023 |  | Course Title | Electrical and Electronics Engineering I |
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| Course Information |  |  |  |  |  |  |
| Course Code | 5437 |  |  | Course Category | Specialized / Compulsory |  |
| Class Format | Lecture |  |  | Credits | School Credit: 1 |  |
| Department | Mechanical Engineering |  |  | Student Grade | 4th |  |
| Term | Second Semester |  |  | Classes per Week | 2 |  |
| Textbook and/or Teaching Materials | Upload reference material to Moodle. |  |  |  |  |  |
| Instructor | HOSOKAWA Atsuishi |  |  |  |  |  |
| Course Objectives |  |  |  |  |  |  |
| 1) Can determine combined resistance/conductance, and combined impedance/admittance. <br> 2) Can determine the voltage and current of an AC circuit using circuit equations involving differentials and integrals. <br> 3) Can determine the voltage and current of an AC circuit using the vector notation. <br> 4) Understand resonant circuits and mutual inductance circuits. |  |  |  |  |  |  |

Rubric

|  | Ideal Level | Standard Level | Unacceptable Level |
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| Achievement 1 | Can determine combined <br> resistance/conductance, and <br> combined <br> impedance/admittance of <br> various electrical circuits. | Can determine combined <br> resistance/conductance, and <br> combined <br> impedance/admittance. | Cannot determine both <br> combined <br> resistance/conductance, and <br> combined <br> impedance/admittance. |
| Achievement 2 | Can analyze various AC circuits <br> using circuit equations involving <br> differentials and integrals. | Can determine the voltage and <br> current of an AC circuit using <br> circuit equations involving <br> differentials and integrals. | Cannot create an AC circuit <br> equation using circuit equations <br> involving differentials and <br> integrals. |
| Achievement 3 | Can analyze various AC circuits <br> using the vector notation. | Can determine the voltage and <br> current of an AC circuit using <br> the vector notation. | Do not understand the vector <br> notation |
|  | Can analyze resonant and <br> mutual induction circuits. | Understand resonant circuits <br> and mutual induction circuits. | Do not understand either or <br> both the resonance circuit <br> and/or the mutual induction <br> circuit. |

## Assigned Department Objectives

## Teaching Method

| Outline | An electrical circuit consists of elements of electrical resistance, inductance, and capacitance, and forms the <br> basics of electrical engineering. We will learn about the relationship between current and voltage in electrical <br> circuits, especially AC circuits, and how to analyze basic electrical circuits. The instructor who have been <br> developing medical equipment in a company will take advantage of their experience to teach in class. |
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| Style | Classes are mainly conducted through note-taking. We will refer to the content of handouts as appropriate for <br> explanation. There will be exercises every two to three weeks of lectures to check students' understanding. |
| Notice | Keep making effort to solve problems by yourself, as exercises take place regularly. <br> Students who miss $1 / 4$ or more of classes will not be eligible for a grade evaluation. |

Characteristics of Class / Division in Learning

| $\square$ Active Learning |  |  |  | $\square$ Aided by ICT | 『 Applicable | Remote Class | Instructor Professionally Experienced |
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| Course Plan |  |  |  |  |  |  |  |
|  |  |  | Theme |  |  | Goals |  |
|  |  | 1st | DC circuits |  |  | Understand Ohm's Law, Kirchhoff's Law, and the direct and parallel circuits. |  |
|  |  | 2nd | AC circuit elements |  |  | Understand the electrical resistance, inductance, and capacitance used in alternating circuits. |  |
|  |  | 3rd | AC circuit equation |  |  | Understand the circuit equation for an alternating circuit consisting of electrical resistance, inductance, and capacitance. |  |
|  | 3rd <br> Quarter | 4th | Exercise on the content from weeks 1 to 3 |  |  | Understand the content from weeks 1 to 3. |  |
|  |  | 5th | AC circuit analysis using the vector notation |  |  | Understand the vector notation of voltage and current and the method of analyzing circuits using the vector notation. |  |
| 2nd |  | 6th | Phasor diagrams |  |  | Understand how to draw Phasor diagrams. |  |
| Semeste |  | 7th | Exercise on the content from weeks 5 to 6 |  |  | Understand the content from weeks 5 to 6. |  |
|  |  | 8th | Midterm exam |  |  | Understand the content from weeks 1 to 6. |  |
|  |  | 9th | Miscellaneous theorem concerning circuit analysis (1) |  |  | Understand how to create loop equations and nodal equations. |  |
|  |  | 10th | Miscellaneous theorem concerning circuit analysis (2) |  |  | Understand the superposition theorem, and Thevenin's and Norton's theorems. |  |
|  | 4th Quarter | 11th | Frequency response of the CR and RC circuits |  |  | Understand the frequency response of the CR and RC circuits and the high and low range pass circuits. |  |
|  |  | 12th | Exercise on the content from weeks 9 to 11 |  |  | Understand the content from weeks 9 to 11. |  |
|  |  | 13th | Resonant circuits |  |  | Understand resonance phenomena and RLC resonance circuits in electrical circuits. |  |


|  | 14th |  | Mutual induction (magnetic coupling) circuits |  | Understand mutual induction(magnetic bond) circuits that are bonded by mutual inductance. |  |
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|  | 15th |  | Exercise on the content from weeks 13 to 14 |  | Understand the content from weeks 13 to 14. |  |
|  | 16th |  | Final exam |  |  | from weeks 9 to 14. |
| Evaluation Method and Weight (\%) |  |  |  |  |  |  |
|  |  | Examination |  | Exercise | Task | Total |
| Subtotal |  | 70 |  | 15 | 15 | 100 |
| Basic Proficiency |  | 0 |  | 0 | 0 | 0 |
| Specialized Proficiency |  | 70 |  | 15 | 15 | 100 |
| Cross Area Proficiency |  | 0 |  | 0 | 0 | 0 |

