| Course Title | Fundamentals of Information Science2 （2） | Instructor(s) | Baiko Sai |
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| | | E-mail | bsai@miu.ac.jp |
| Class Style | Lecture, seminar, etc. | Office Hours | Thursday PM |
| Track | | Mode of Instruction | Of-line |
| Credits | 2 | Allocated Year | 1st or 2nd year |
| Active Learning | Included | Compulsory or Elective | Compulsory |
| Course Overview | Based on the mathematics learned up to high school, students will acquire the basic mathematical skills necessary to understand and apply the information and communication engineering they will study at university. By frequently assigning homework assignments and explaining exercises during class, we aim to help students acquire practical skills. | | |
| Course Objectives | T In this course, you will understand the concepts in the following range, which will be useful for future information-related courses: <br> 1. Calculation of expressions and types of numbers 2. Numbers and logical operations used in computers and information communications 3. Definition and calculation of complex numbers 4. Meaning of functions and equations 5. How to calculate matrices and determinants 6. Trigonometric functions 7. Plane figures and expressions 8. Vector calculation 9. Sequences 10. Limits 11.Differentiation and applications 12. Integration and applications | | |
| Prerequisite | | | |

| | No | Contents | Homework |
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| Course Schedule | 1 | Part 1: Formula calculation and number types <br> #1: The meaning of algebraic expressions, expanding and factoring expressions, division of polynomials, calculation and transformation of fractional expressions, and Exercises. | Yes |
| | 2 | Part 2: Numbers and logical operations used in computers <br> #2: Understand hexadecimal, octal, and binary numbers used in computer information processing, and perform calculations to convert between them, with Exercises. | Yes |
| | 3 | Part 3: Complex numbers <br> #3: Types of numbers, definition and calculation of complex numbers, solution of $x^n=\alpha$ on the complex plane, Exercises. | Yes |
| | 4 | Part 4: Functions and Equations <br> #4: Types of functions, domains and ranges, implicit function representation and parametric representation, inverse functions, quadratic equations, fractional equations, and Exercises. | Yes |
| | 5 | Part 5: Trigonometric functions (part 1) <br> #5: Definitions of trigonometric functions, basic formulas of trigonometric functions, properties of trigonometric functions, main trigonometric function values, Exercises. | Yes |
| | 6 | Part 6: Trigonometric functions (part 2) <br> #6: Properties of angular functions, waveforms and periodicity of trigonometric functions, inverse trigonometric functions, and applications of sine wave predictive wave functions in the fields of information, electronics, and electrical engineering. Exercises. | Yes |
| | 7 | Part 7: Discussion on the contents of 1 to 6 <br> #7: Discuss the homepages you have learned about. | No |

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| | | Summarize the discussion and upload it to Moodle. | |
| | 8 | Part 8: Exponential and logarithmic functions<br>#8: Laws of exponents, definition and graph of exponential function, definition and graph of logarithmic function, natural logarithm and common logarithm, meaning of decibel, cascade connection of amplifiers, and other applications in the field of information and electronic science. Exercises. | Yes |
| | 9 | Part 9: Plane figures and equations<br>#9: Two-dimensional coordinate representation of points and distance, relationship between functions and equations, and Exercises. | Yes |
| | 10 | Part 10: Vector Algorithm<br>#10: Vectors and scalars, displaying vectors, addition and difference of vectors, practice problems, scalar product, vector product, Exercises. | Yes |
| | 11 | Part 11: Sequence<br>#11: How to calculate arithmetic progressions and their proofs, how to calculate geometric progressions and their proofs, the symbol $\Sigma$ (sigma) and its properties. Exercises. | Yes |
| | 12 | Part 12: Limits of sequences and functions<br>#12: Calculating limits, maxima, minima and extrema of sequences. Convergence, divergence and oscillation of infinite series. Calculating limits of continuous functions and applications. Exercises. | Yes |
| | 13 | Part 13: Differential Calculus and Its Applications<br>#13: Definition, meaning, calculation and application of differentiation. Exercises. | Yes |
| | 14 | Part 14: Integration methods and applications of integration<br>#14: Definition, meaning, calculation and application of integrals. Exercises. | Yes |
| | 15 | Part 15: Summary<br>#15: A short test. Discussion on what was learned. Preparation for the test. Summarize the discussion and upload it to moodle. | No |
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| Grading | Quiz                           20 %<br>Assignments                    30 %<br>Credit validation exam         50%<br>Perform a comprehensive evaluation. |
| Textbooks | Self-made |
| References | Basic Mathematics for Electrical and Electronic Engineering, by Takeaki Mori and Masaru Oya, Morikita Publishing Co., Ltd., ¥2,100, March 1996 |
| NOTES | Before lecture: Preparation<br>After the lecture: Exercises |