| Tsuyama College | Year | 2020 | | Course Title | 応用数学Ⅰ |
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## Course Information

| Course Code | 0016 | | Course Category | Specialized / Compulsory |
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| Class Format | Lecture | | Credits | School Credit: 1 |
| Department | Department of Mechanical Engineering | | Student Grade | 4th |
| Term | First Semester | | Classes per Week | 2 |
| Textbook and/or Teaching Materials | | | | |
| Instructor | MATSUDA Osamu | | | |

## Course Objectives

Purpose of learning: To understand the meaning of statistics be able to estimate and test from actual statistical data.

Attainment target
1. You can find various probabilities and understand the probability of complementary events, the addition theorem of probability, and the probability of mutual exclusivity.
2. To be able to find conditional probabilities and understand the multiplication theorem of probabilities and the probabilities of independent events.
3. To understand 1D and 2D data to obtain mean, variance, standard deviation, correlation coefficient, and regression line.
4. To understand the basic sample distribution and be able to calculate probabilities using it.
5. To learn how to estimate and test the population parameter.

## Rubric

| | Ideal Level | Standard Level | Unacceptable Level |
|---|---|---|---|
| Achievement 1 | Clearly understand the probability of complementary events, the addition theorem of probability, and the probability of mutual exclusivity, and solve basic problems. | Can solve about 60% of the basic problems of probability of complementary events, the addition theorem of probability, and the probability of mutual exclusivity. | Cannot solve about 60% of the basic problems of the probability of complementary events, the addition theorem of probability, and the probability of mutual exclusivity. |
| Achievement 2 | Understand conditional probabilities, multiplication rules of probabilities, and probabilities of independent events, and be able to solve basic problems. | Can solve about 60% of the basic problems of conditional probability, multiplication rule of probability, and probability of independent events. | Cannot solve about 60% of the basic problems of conditional probability, multiplication rule of probability, and probability of independent event. |
| Achievement 3 | Clearly understand the meanings of mean, variance, standard deviation, correlation coefficient, regression line, etc. for 1D and 2D data and can calculate them. | Understand and can calculate the mean, variance, standard deviation, correlation coefficient, regression line, etc. of 1D and 2D data. | Doesn't understand the mean, variance, standard deviation, correlation coefficient, regression line, etc. of 1D and 2D data. |
| Achievement 4 | Clearly understand the meaning of the basic sample distribution and can calculate probability using it. | Can calculate using a basic sample distribution and work about 60% of problems. | Cannot calculate using a basic sample distribution and cannot work about 60% of problems. |
| Achievement 5 | Clearly understand the method of estimating the population parameter and the method of the test, and can solve the standard problems related to them. | Can solve about 60% of the standard problems related to the method of estimating the population parameter. | Cannot solve about 60% of the standard problems related to the method of estimating the population parameter. |

## Assigned Department Objectives

## Teaching Method

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| Outline | General or Specialized : Specialized<br><br>Field of learning : Natural science Common / Basic<br><br>Required, Elective: Elective must complete subjects<br><br>Foundational academic disciplines : Mathematical science / Mathematics / Analysis basics<br><br>Relationship with Educational Objectives : This subject corresponds to the learning goal "(2) Acquire basic science and technical knowledge".<br><br>Relationship with JABEE programs : The main goal of learning / education in this class are "(A) , A-1".<br><br>Class Outline: In Applied Mathematics I, you will learn the basics of probability theory and statistics. In probability theory, we look at the theory of distributions (binomial distribution, Poisson distribution, normal distribution) and the central limit theorem, which are important in statistical processing. Learn the equations of correlation and regression line as an arrangement of two-variable data. Finally, learn how to estimate and test the population. |
| Style | Course method : Focus on understanding the content on the board, and assign as many exercises as possible to deepen understanding.<br><br>Grade evaluation method : 4 regular exams (50%) and other exams, exercises, reports and effort of class(50%). etc, A re-examination may be conducted. The retest will be evaluated in the same way as the main test, with an upper limit of 80 points. Textbooks, notebooks, etc. are not allowed for the exam. |

| | | | Theme | Goals |
|---|---|---|---|---|

| | | Precautions on enrollment : Students must take this class (no more than one-third of the required number of class hours missed) in order to complete the academic year. |
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| Notice | Precautions on enrollment : Students must take this class (no more than one-third of the required number of class hours missed) in order to complete the academic year.<br><br>Course advice: This course teaches the basic ideas of probability and statistical methods required for engineering, so this course is of great importance.<br><br>Foundational subjects : Fundamental Mathematics (1st year), Fundamental Linear Algebra (2nd), Differential and Integral Ⅰ (2nd), Differential and Integral Ⅱ (3rd)<br><br>Related subjects: Mathematics, physics, and other subjects after the third year<br><br>Attendance advice : If you are late after, you may be treated as absent after a warning. |
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## Course Plan

| | | | Theme | Goals |
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| 1st Semester | 1st Quarter | 1st | Guidance Definition and nature of probability 1 | Understanding the basic formula of probability |
| | | 2nd | Definition and property of probability 2 | Understanding iterative trials |
| | | 3rd | Various probabilities | Understanding conditional probabilities |
| | | 4th | Various probabilities 2 | Understanding Bayes' theorem |
| | | 5th | Random variables and probability distribution 1 | Understanding Random Variables and Probability Distributions |
| | | 6th | Random variables and probability distribution 2 | Understanding the binomial distribution and Poisson distribution |
| | | 7th | Probability and random variable exercises | |
| | | 8th | First term midterm exam | |
| | 2nd Quarter | 9th | Return and explanation of answers, random variables and probability distribution 3 | Understanding the normal distribution |
| | | 10th | Random variables and probability distribution 4 | Understanding the binomial and normal distributions |
| | | 11th | One-dimensional data 1 | Understanding frequency distribution table and representative values |
| | | 12th | One-dimensional data 2 | Understanding variance and standard deviation |
| | | 13th | 2 variable data 1 | Understanding correlation |
| | | 14th | 2 variable data 2 | Understanding regression lines |
| | | 15th | Last term exam | |
| | | 16th | Return of answer, commentary, supplementary explanation | |

## Evaluation Method and Weight (%)

| | Examination | Presentation | Mutual Evaluations between students | Behavior | Portfolio | Other | Total |
|---|---|---|---|---|---|---|---|
| Subtotal | 50 | 0 | 0 | 0 | 0 | 50 | 100 |
| Basic Proficiency | 50 | 0 | 0 | 0 | 0 | 50 | 100 |
| Specialized Proficiency | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cross Area Proficiency | 0 | 0 | 0 | 0 | 0 | 0 | 0 |