

Tsuyama College		Year	2021		Course Title	Differential and Integral I
Course Information						
Course Code	0035		Course Category	General / Compulsory		
Class Format	Lecture		Credits	School Credit: 3		
Department	Department of Integrated Science and Technology Electrical and Electronic Systems Program		Student Grade	2nd		
Term	Year-round		Classes per Week	3		
Textbook and/or Teaching Materials	Textbook: Saito et al., New Calculus I (Dainippon Tosho), Reference book: Saito et al., New Calculus I Problem Collection (Dainippon Tosho)					
Instructor	YOKOTANI Masaaki					
Course Objectives						
Learning purposes: Familiarize yourself with the concept and handling of differentiation and integration.						
Course Objective						
1. To can understand the concept of differentiation and find the derivative of a basic function.						
2. To can draw the increase / decrease table of the function, find the extremum, and draw the outline of the graph.						
3. To can understand the concept of integrals and be able to find indefinite integrals and definite integrals of basic functions.						
4. To by applying the integral, the length of the curve and the volume of the solid can be obtained.						
Rubric						
	Excellent	Good	Acceptable	Not acceptable		
Achievement 1	The composite function can be differentiated.	The limit of standard-level functions can be found. Standard functions can be differentiated using product and quotient formulas.	The limit of a basic function can be found. You can differentiate basic functions.	The limit of a function represented by a polynomial can be found. Functions represented by polynomials can be differentiated.		
Achievement 2	The maximum and minimum values can be obtained.	The tangent equation can be found. You can write an increase / decrease table to find the extremum and draw the outline of the graph.	Can write the increase / decrease table correctly.	The application of differential calculus is inadequate.		
Achievement 3	An indefinite integral or a definite integral can be obtained by using the integration by substitution method or the integration by parts method.	Indefinite integrals and definite integrals can be obtained for standard-level functions.	Indefinite integrals and definite integrals can be obtained for basic functions.	Functions represented by polynomials can be integrated.		
Achievement 4	The length of the curve and the volume of the solid can be obtained.	The area of the figure surrounded by the standard level curve and the length of the curve can be obtained.	The area of the figure surrounded by the basic curve can be obtained.	The application of the integral method is inadequate.		
Assigned Department Objectives						
Teaching Method						
Outline	General or Specialized : General					
	Field of learning : Natural science common and basic					
	Foundational academic disciplines : Mathematical science / mathematics / basic analysis					
	Relationship with Educational Objectives : This class is equivalent to "② Acquire basic science and technical knowledge".					
	Relationship with JABEE Programs : The main goal of learning/education on this class is is "(A)".					
	Class Outline : The differential calculus, along with the integral method, was discovered by Newton and Leibniz in the 17th century. In the first semester, you will learn to differentiate various functions, and learn how to find tangents and normals, and the limit of indeterminate forms. After it was recognized that the integral calculation was the inverse of the differential calculus, many quadrature problems became easier to calculate. In the second half, you will learn about the integration method and how to find the area of figures, the length of curves, and the volume of solids.					
Style	Course method : Classes will be centered on board writing, but at the same time, as much exercise time as possible will be provided so that students can understand the content of the lecture more deeply and acquire the ability to solve problems on their own.					
	Grade evaluation method : Evaluate the total of 4 regular exams (60% evaluated equally) and other exams, exercises, reports, and lesson approaches (40%). Depending on the grades, etc., a retaking exams may be conducted (report submission is required). Textbooks, notebooks, etc. are not allowed for the exam.					

Notice	Precautions on the enrollment : Students must take this class(no more than one-third of the required number of class hours missed) are required to complete the course of the academic year.			
	Course advice : It is important to make sure to prepare and review, and to understand the lecture contents more deeply by solving the exercises on your own.			
	Foundational subjects : Fundamental mathematics (1st year), Fundamental mathematics practice (1)			
	Related subjects : Mathematics, physics, and other subjects after the 3rd year			
	Attendance advice : It is important to understand the content of the lecture and solve the problem yourself. I want you to value finding a solution on your own. If there are many late arrivals (those who came 10 minutes after the start of class), they may be treated as absent after giving a warning.			
Characteristics of Class / Division in Learning				
<input type="checkbox"/> Active Learning		<input type="checkbox"/> Aided by ICT		<input type="checkbox"/> Applicable to Remote Class
<input type="checkbox"/> Instructor Professionally Experienced				
Must complete subjects				
Course Plan				
			Theme	Goals
1st Semester	1st Quarter	1st	Guidance, functions and their properties, limits of functions	The limits of various functions can be found.
		2nd	Derivative coefficient, derivative	Understand and obtain the meaning of differential coefficients. Understand the definition of derivatives.
		3rd	Derivative properties	Understand the nature of derivatives.
		4th	Derivatives of trigonometric functions, derivatives of exponential functions	The derivatives of trigonometric functions and exponential functions can be obtained.
		5th	Derivatives of composite functions, derivatives of logarithmic functions	Derivatives of composite functions and logarithmic functions can be obtained.
		6th	Inverse trigonometric function and its derivative	Understand inverse trigonometric functions. The derivative of the inverse trigonometric function can be obtained.
		7th	Exercises	
		8th	1st semester mid-term exam	
	2nd Quarter	9th	Return and commentary of exam answers, continuity of functions	Understand the continuity of functions.
		10th	tangents and normals, and Increase / decrease of functions	You can find tangent and normal equations for basic functions. You can find the increase or decrease of the function.
		11th	Maximum and minimum, and maximum and minimum of function	You can write an increase / decrease table of a function, find an extremum, and draw an outline of a graph. The maximum and minimum values of the function can be calculated.
		12th	Indeterminate limit, higher order derivative	The limit of indeterminate form can be found. It is possible to obtain a derivative of degree 2 or higher.
		13th	Curve unevenness, parameter representation and differential calculus	The unevenness of the curve can be obtained. Understand the parameter representation of a function and be able to calculate its derivative.
		14th	(Do not do velocity and acceleration), mean value theorem, exercises	Understand the mean value theorem.
		15th	1st semester final exam	
		16th	Return and commentary of exam answers	
2nd Semester	3rd Quarter	1st	Indefinite integral	Understand the definition of indefinite integral and be able to perform basic calculations.
		2nd	Definition of definite integral, basic theorem of differential integral method	Understand the definition of definite integral and the basic theorem of the differential integral method, and be able to obtain the value of definite integral.
		3rd	Definite integral calculation	The definite integral can be calculated using the basic theorem of the differential integration method.
		4th	Various indefinite integral formulas	Various indefinite integral formulas can be used.
		5th	Integration by substitution	The integration by substitution method can be used to find the indefinite and definite integrals of basic functions.
		6th	Integration by parts	The integration by parts method can be used to find the indefinite and definite integrals of basic functions.
		7th	Application of integration by substitution and integration by parts	The integration by substitution method and integration by parts method can be applied.
		8th	2nd semester mid-term exam	
	4th Quarter	9th	Integral of various functions	

		10th	Area of figure	The area of the figure surrounded by the basic curve can be obtained.
		11th	Curve length, solid volume	The lengths of various curves can be obtained. The volume of a basic solid can be obtained.
		12th	Graphic by parametric display	The area, length, volume, etc. of the figure can be obtained by displaying the parameters.
		13th	Polar coordinates	Understand polar coordinates, draw graphs of polar equations, and find relevant areas.
		14th	Improper integral	The improper integral can be calculated.
		15th	2nd semester final exam	
		16th	Return and commentary of exam answers	

#### Evaluation Method and Weight (%)

	Examination	Presentation	Mutual Evaluations between students	Behavior	Portfolio	Other	Total
Subtotal	60	0	0	0	0	40	100
Basic Proficiency	60	0	0	0	0	40	100
Specialized Proficiency	0	0	0	0	0	0	0
Cross Area Proficiency	0	0	0	0	0	0	0