

# Calculus

Syllabus Number 2G103  
Basic Major Subjects  
Requisites 2 credit  
WATANABE, Ryuji

## 1. Course Description

This course provides an introduction to calculus of functions of many variables and differential equations necessary in the following mathematical courses and specialized courses. The items are as follows: Functions of many variables, partial derivative, differentiation of composite functions, mean value theorem, Taylor's expansion, maximum and minimum, determination of extreme values, theorem on implicit functions, conditional problem of extreme values, multiple integral, iterated integral, change of the order of integration, multiple integration by polar coordinates, integration of Gauss distribution, differential equation and its solutions, and homogeneous linear differential equation of the second order with constant coefficients.

The classes consist of lectures and exercises. Students will give presentations on homework assignments in the classes.

This subject is related to the clause 1 of the diploma policy of the Department of Aerospace Engineering.

## 2. Course Objectives

This course aims to improve the basic knowledge of mathematics for scientists and engineers and to enhance students' overall mathematical levels by solving mathematical problems in order that they can study textbooks in specialized courses on their own.

## 3. Grading Policy

The term-end examination (80%) and presentations on homework assignments in the classes (20%) will be evaluated.

The acceptance line is accuracy rate of 60% in the above term-end examination and presentations on homework assignments.

## 4. Textbook and Reference

### Textbook

Y.Tashiro "Engineering Mathematics: Calculus (2nd edition)" Morikita Publishing (1999) in Japanese. (ISBN 4-627-04932-3)

### Reference

Unnecessary

## 5. Requirements(Assignments)

Students are required to review the lectures and to do the homework assignments.

Preparation of calculus of the functions of one valuable on a university level is also required.

## 6. Note

It is recommended for students to access the homework assignments on the LMS.

It is prohibited for students to refer the textbook and notebook in term-end examination and makeup examination.

## 7. Schedule

- [1] Functions of many variables : Functions of many variables
- [2] Differentiation of the functions of many variables : Partial derivative
- [3] Differentiation of the functions of many variables : Differentiation of composite functions
- [4] Differentiation of the functions of many variables : Mean value theorem, Taylor's expansion
- [5] Differentiation of the functions of many variables : Maximum and minimum
- [6] Differentiation of the functions of many variables : Determination of extreme values
- [7] Differentiation of the functions of many variables : Theorem on implicit functions
- [8] Differentiation of the functions of many variables : Conditional problem of extreme values
- [9] Integration of the functions of many variables : Multiple integral
- [10] Integration of the functions of many variables : Iterated integral, Change of the order of integration
- [11] Integration of the functions of many variables : Multiple integration by polar coordinates
- [12] Integration of the functions of many variables : Integration of Gauss distribution
- [13] Differential equations : Differential equation and its solutions
- [14] Differential equations : Homogeneous linear differential equation of the second order with constant coefficients
- [15] Review, Term-end examination