Course number	U-LAS10 20002 LE55		
Course title (and course title in English)	Advanced Calculus I-Vector Calculus Advanced Calculus I-Vector Calculus	Instructor's name, job title, and department of affiliation	Graduate School of Engineering Associate Professor,QURESHI, Ali Gul
Group	Natural Sciences	Field(Classification)	Mathematics(Development)
Language of instruction	English	Old group	Group B
Number of credits	2		
Number of weekly time blocks	1	Class style	Lecture (Face-to-face course)
Year/semesters	2025・First semester		
Days and periods	Wed.5	Target year	2nd year students or above
Eligible students	For science students		

[Overview and purpose of the course]

Based on the knowledge of Calculus with Exercises A/B and Linear Algebra with Exercises A/B , or Calculus A/ B and Liner Algebra A/B, this course explains calculus of multiple variables and vector calculus. The course introduces the concepts of motion and potential in more than 2 dimensions, which are based on partial differentiation and integration related with multiple dimensions (such as line integral and surface integral).

[Course objectives]

To learn basics of calculus in functions of two or more variables, which are used in many other courses in natural sciences (such as Physics) and engineering.

[Course schedule and contents)]

1. Basic operations with vectors (5 Weeks)
- Dot and cross products; derivatives and integration of Vector Valued Functions
2. Vectors in other coordinate systems (2 Weeks)
- Frenet-Serret frame, Spherical and Cylindrical coordinate systems
3. Vector fields and potentials at n-dimensional Euclidean spaces (2 weeks)
- Operations over the vector fields (gradient, curl and divergence), scalar potential and vector potential
4. Line integrals and surface integrals (5 Weeks)
- Line integrals at 2-dimensional plane, surface integrals at 3-dimensional space, and integral theorems (Divergence theorem of Gauss, the Green's formula and the Stokes's theorem)
5. Feedback（1 Week）

[Course requirements]

To understand Calculus with Exercises A/B and Linear Algebra with Exercises A/B, or Calculus A/B and Linear Algebra A/B.

[Evaluation methods and policy]

Weekly submission of class examples, class participation and homework (25%), Snap quizzes (25%), Final examination(50%)

Continue to Advanced Calculus I-Vector Calculus(2)↓↓↓

Advanced Calculus I-Vector Calculus(2)

[Textbooks]

Instructed during class

[References, etc.]

（References, etc.）

Gilbert Srang et al. 『Calculus Vol. 3』 （Open Stax） （Book is available online at https://openstax.org/details/books/calculus-volume-3）
Joel R. Hass, Christopher E. Heil and Maurice D. Weir 『Thomas' Calculus, 14th ed.』 （Pearson）
Erwin Kreyszig 『Advanced Engineering Mathematics, 10th ed.』 （Willey）
Frank Ayres Jr. and Elliott Mendelson 『Calculus, 6th ed.』 （McGraw-Hill）

[Study outside of class (preparation and review)]

Students are encouraged to do assigned homework related to the classes.

[Other information (office hours, etc.)]

[Essential courses]