科目ナンバリング	U-LAS10 20002 LE55						
授業科目名<英訳>	Advanced Calculus I-Vector Calculus Advanced Calculus I-Vector Calculus			担当者所属職名・氏名	工学研究科　准教授　QURESHI, Ali Gul		
群	自然科学科目群			分野(分類)	数学(発展)	使用言語	英語
旧群	B群	単位数	2単位	週コマ数	1コマ	授業形態	講義（対面授業科目）
開講年度・開講期	2024・前期	曜時限	水5	配当学年	2回生以上	対象学生	理系向

[授業の概要・目的]

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).

[到達目標]

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.

[授業計画と内容]

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）

[履修要件]

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

[成績評価の方法・観点]

Weekly submission of class examples, class participation and homework (20%), Snap quizzes (15%), Final examination(65%)

[教科書]

授業中に指示する

[参考書等]

（参考書）

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）

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Advanced Calculus I-Vector Calculus(2)

[授業外学修（予習・復習）等]

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

[その他（オフィスアワー等）]