科目ナンバリング	U-LAS10 10005 LE55						
授業科目名 <英訳>	Calculus with Exercises B Calculus with Exercises B			担当者所属 職名・氏名	理学研究科　准教授　劉　逸侃 理学研究科　助教　ADAMO, Maria Stella		
群	自然科学科目群	分野(分類)	数学(基礎)		使用言語	英語	
旧群	B群	単位数	3単位	週コマ数	2コマ	授業形態	講義（対面授業科目）
開講年度・開講期	2026・後期	曜時限	火2・水2	配当学年	主として1回生	対象学生	理系向

[授業の概要・目的]

Calculus and linear algebra form the essential mathematical background necessary for understanding and developing modern science and technology. In this lecture, basics of calculus required for further pursuing of studies majored in science are explained.

The course Calculus with Exercises B, after providing some more topics on functions of one variable that were not mentioned in "Calculus with Exercises A", explains differentiation and integration of functions of several variables.

[到達目標]

The objective of this course is to learn and understand basic notions of differentiation and integration of functions of one and several variables and methods of mathematical analysis based on them, as well as to become able to apply this knowledge to solving problems.
In addition to mastering the basic calculus, students can learn through this course how to discuss and present mathematical topics in English.

[授業計画と内容]

This subject is composed of two interrelated parts: Lecture and Exercises. The exercises sessions will take place basically once in two weeks, their purpose being to deepen the students' understanding of the contents of the lecture sessions through active participation in problem solving and through regular submission of reports.

In the course outline below, the order in which the given items will be presented is not fixed and depends on the background and understanding of the enrollees.

1. Series and sequences of functions (3-4 weeks)
Infinite series (convergence criteria, absolute and conditional convergence), power series (radius of convergence, termwise differentiation and integration), sequences and series of functions (uniform convergence, termwise differentiation and integration).
2. Sets of points in a plane and in space (2-3 weeks)
Distance, convergence of sequences of points, open sets, closed sets, properties of continuous functions.
3. Differentiation of functions of several variables (4-5 weeks)
Partial differential coefficients, total differentiability, tangential plane, gradient vector, differentiation of composite functions (chain rule), Jacobian matrix and determinant, implicit functions, inverse mapping, Taylor's formula, extreme value problems, extreme value problems with constraints.
4. Integration of functions of several variables (4-5 weeks)
Multiple integrals, iterated integrals, calculation of area and volume, change of variables for multiple integrals, improper integrals.

Total：14 classes, 1 Feedback session

Calculus with Exercises B(2)へ続く↓↓↓

Calculus with Exercises B(2)

[履修要件]

Students must attend the course “Calculus with Exercises A” before taking “Calculus with Exercises B”. Moreover, students are expected to have a good knowledge of the course “Linear Algebra with Exercises A”.

[成績評価の方法・観点]

The final grade is a comprehensive assessment based on performance in both the lecture and exercise components of the course. Students are required to attend and actively participate in both sessions to receive a passing grade. The total score is weighted as follows:
- Lecture Component (approx. 2/3 of the total grade): Evaluated by the professor in charge of lectures.
- Exercise Component (approx. 1/3 of the total grade): Evaluated by the professor in charge of exercises.

The specific evaluation criteria for both components will include a combination of the following:
1. In-class Participation: Engagement during both lecture and exercise sessions.
2. Assignments and Reports: Periodic take-home homework or technical reports.
3. Mid-term exam: A mid-term examination or equivalent evaluation may be conducted at the discretion of the instructors.
4. Final Examination: A comprehensive examination covering the course material.

The final distribution of points across these categories will be finalized based on the progression of the course.

Details will be explained in class.

[教科書]

授業中に指示する

[参考書等]

（参考書）
A. M. Bruckner, J. B. Bruckner, B. S. Thomson 『Elementary Real Analysis』（Prentice-Hall）（This book can be downloaded for free at https://classicalrealanalysis.info/Free-Downloads.php .）
M. Lovric 『Vector Calculus』（John Wiley & Sons）ISBN:978-0-4717-25695
I. Kriz, A. Pultr 『Introduction to Mathematical Analysis』（Birkhauser）ISBN:978-3-0348-0635-0

[授業外学修（予習・復習）等]

It is difficult to follow the lecture without regular study. Therefore, students are expected to devote an amount of time equivalent to the time of the lecture to solve report problems and to review the contents of previous lectures.

[その他（オフィスアワー等）]

It is desirable to take the course “Linear Algebra with Exercises B” in parallel.

There are no fixed office hours. If you wish to have a consultation, please feel free to contact the lecturer.

[主要授業科目（学部・学科名）]

理学部