**Mathematical Analysis (II) Syllabus**

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**I．Basic Information of the course**

**Course Name**: Mathematical Analysis (I)  
**Course Identification Number:**100616T004

**Faculty or Department:** Department of Mathematics; College of Science

**Credits: 6**

**Total hours:** 96

**Lab hours:** 0

**Computer Hours:** 0

**Course Category (compulsory/limited/selective, semester, type):** compulsory,

**Target major:** pure and applied mathematics undergraduates

**Prerequisites:** Mathematical Analysis (I)

**Subsequent course:** Mathematical Analysis (III)，Function of Real Variable, Complex Function with One Variable, Functional Analysis, Differential Equation, Probability Theory

**II．Course description**

Mathematical Analysis(Ⅱ)is a follow-up course of Mathematical Analysis(Ⅰ).It contains infinite series (Numerical Series, Series of Functional Terms), Limit and Continuity on Euclid Spaces, Multivariate Function Differential Calculus, Multivariate Function Integral Calculus (Multiple-Integral, Line-Surface Integral). Through the study of this course, it can provide necessary fundamental knowledge for the subsequent courses such as Mathematical Analysis(Ⅲ), Real Variable Function Theory, Complex Function Theory, Functional Analysis ,Differential Equation, Probability Theory etc and the related elective courses. Simultaneously, it can provide necessary trainings for mathematical thinking and quality of students. So the students are expected to deepen understanding of the basic concepts and theories. Besides, through the training of plentiful exercises, the abilities of calculating skills, abstract thinking, logical argumentation, space imagination and using knowledge to solve problems are expected to develop.

**III. Object of the Course**

Students should master the basic definitions, theories of the course. students should acquire the basic calculation ability, the logical and spatial thinking abilities. Furthermore, the students should acquire the ability to solve mathematical problems using the acknowledges of the course.

The students should meet the following requirements:

1. Master the concepts of series and solve the series problems

2. Master the derivative and integral of multivariable functions.

3. Master calculation methods and relevant theories of limit, differentiation and integral of multivariate function

4. Master the concepts of integral on lines and surfaces

5. Solve some practical problems using the knowledges of the course

**IV. Course contents and teaching objectives**

The teaching includes 6chapters of lectures to be finished in the fall semester. The contents, objectives and hour allocation are as follows:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Contents** | | **Objectives** | | | | **H**  **o**  **u**  **r**  **s** |
| m  e  m  o  r  i  z  e | understanding | application | comprehensive analysis |
| **Chapter 9**  **Series of Constant Terms** | **Unit 1** Convergence of Series of Constant Terms |  | A | A |  | 4 |
| **Unit 2**suprem limits and minim limits |  | A | A |  | 2 |
| **Unit 3**Series with Positive Terms |  | A | A |  | 4 |
| **Unit 4**Series with Arbitrary Terms |  | A | A |  | 2 |
| **Unit 5**Infinite Product and Infinite Series |  | A | A |  | 4 |
| **Chapter**  **10**  **Series with Function Terms** | **Unit 1**Uniform convergence of a series with function terms |  | A | A |  | 4 |
| **Unit 2**Properties and convergence criteria for consistent convergence series |  | A | A |  | 4 |
| **Unit 3**Power series |  | A | A |  | 4 |
| **Unit 4**Power series expansion of a function |  | A | A |  | 4 |
| **Unit 5**Approximation of Continuous Function by Polynomial | A |  |  |  | 2 |
| **Chapter**  **11Limit and continuity on Euclid Space** | **Unit 1**Fundamental Theorem on Euclid Space |  | A | A |  | 4 |
| **Unit 2**Continuity of Function with Several Variables |  | A | A |  | 4 |
| **Unit 3**Properties of Continuous Function |  | A | A |  | 4 |
| **Chapter**  **12**  **Calculus of Function with Several Variables** | **Unit 1**Partial Derivative and Total Differential |  | A | A |  | 4 |
| **Unit 2**Differential rule of Compound Function with Several Variables |  | A | A |  | 4 |
| **Unit 3**Mean Value Theorem and Taylor Formula |  | A | A |  | 2 |
| **Unit 4**Implicit Function |  | A | A |  | 4 |
| **Unit 5**Applications of Partial Derivative in Geometry |  | A | A |  | 4 |
| **Unit 6**Extremum Values without Condition |  | A | A |  | 2 |
| **Unit 7**Conditional Extremum and Lagrange Multiplication |  | A | A |  | 2 |
| **Chapter**  **13**  **Multiple Integral** | **Unit 1**Multiple Integral on Bounded Closed Regions |  | A | A |  | 4 |
| **Unit 2**Properties and Evaluation of Multiple Integral |  | A | A |  | 4 |
| **Unit 3**Integration by Substitution |  | A | A |  | 4 |
| **Unit 4**Improper Multiple Integral |  | A | A |  | 4 |
| **Unit 5**Differential Forms | A |  |  |  | 2 |
| **Chapter 14**  **Integral over Curve and Surface** | **Unit 1**First Type Integral over Curve and Surface |  | A | A |  | 4 |
| **Unit 2**Second Type Integral over Curve and Surface |  | A | A |  | 6 |
| Total | | | | | | 96 |

Notes:

In the column of “objectives”, A, B and C indicate the degree to which a student is supposed to grasp the contents of lectures, A for highest degree and Null for no requirements.

Memorize means one can retrieve relevant knowledge, concepts, terms or other information in his/her memory bank, compare them with the current information and then confirm; one can memorize, list or describe them indiscriminately.

Understand means one can organize, categorize, explain, summarize what he/she has learned and make inferences about them or expand on them.

Apply means one can choose appropriate procedures and applications to apply what he/she has learned to calculation and decision making.

Comprehensive Analysis means one can identify the components in what he/she has learned and construct their relationship; or one can plan, build, construct or change and reconstruct; or one can comment, summarize, estimate, predict, evaluate, confirm or defend.

**V. Teaching Method**

Interactive teaching in classroom and classroom exercises

**VI. Evaluation**

The total grade = assignment and in-class performance (assignments, tests, attendancy, classroom performance) **20%+**four test grades\*20%+ final exam \*60%

**VII. Textbooks and Reference Books**

(I)Textbook

**Mathematics Analysis**, Chen Jixiu, Yu Chonghua, Jin Lu, Higher Education Publisher, 2004.

(II)Reference books

1. **Mathematical analysis**, the math department of Jilin, People Education Publisher,2008.
2. **Mathematical analysis**, Guangzhong OuYang, Xueyan Zhu, Fulin Jin, Chuanzhang Chen, High Education Publisher, 2013.
3. **Mathematics Analysis Exercise**, Б.Д，Jimiduoweiqi (USSR), Higher Education Publisher, 1978.
4. **Mathematics Analysis Exercise**, Lin Yuanquect, Higher Education Publisher, 1986.
5. **Mathematical analysis I**, V. A. Zorich, Springer, 2006.
6. **Mathematical analysis II**, V. A. Zorich, Springer, 2006.
7. **Calculus**, J. Stewart, High Education Publication, 2014.