**Course Syllabus for Mathematical Analysis (III)**

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**I．Basic Information of the course**

**Course Name**: Mathematical Analysis (III)  
**Course Identification Number:**100616T005

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

**Credits: 2**

**Total hours:** 32

**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),Mathematical Analysis (II)

Subsequent course: Function of Real Variable, Complex Function with One Variable, Functional Analysis, Differential Equation, Probability Theory

**II．Course description**

Mathematical Analysis（Ⅲ）is the follow-up courses of Mathematical Analysis（Ⅱ）.It contains primary field theory, integral with parameter and Fourier-Series. Through the study of this course, on the one hand, the students will be familiar with direct application of Calculus and extension of some related concepts. On the other hand, it can provide necessary fundamental knowledge for the subsequent courses and the related elective courses. 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 be developed.

**III. Course outcomes:**

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.

Students should meet the following requirements after the course:

1. Master the basic methods of curve integral and surface integral
2. Master the definition of derivative and the integral
3. Master the concept of parameter integral
4. Master the Fourier series.
5. Solve some practical problems using the knowledges of the course

**IV. Course contents and teaching objectives**

The teaching includes 3chapters 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 | u  n  d  e  r  s  t  a  n  d | a  p  p  l  y | comprehensive analysis |
| **Chapter 15**  **Integral over Curve and Surface, Field Theory** | **Unit 1**Green Formula, Gauss Formula and Stokes Formula |  | A | A |  | 6 |
| **Unit 2**Exterior Differentiation of Differential Form |  | A | A |  | 2 |
| **Unit 3**Fundamentals of Field Theory |  | A | A |  | 2 |
| **Chapter 16**  **Integral with Parameter** | **Unit 1**)Proper Integral with Parameters |  | A | A |  | 4 |
| **Unit 2**Improper Integral with Parameters |  | A | A |  | 4 |
| **Unit 3**Euler Integration |  | A | A |  | 4 |
| **Chapter 17**  **FourierSeries** | **Unit 1**Expansion of Function by Fourier Series |  | A | A |  | 2 |
| **Unit 2**Criterion for Convergence of Fourier Series |  | A | A |  | 2 |
| **Unit 3**Properties of Fourier Series |  | A | A |  | 2 |
| **Unit 4**Fourier Transformation and Fourier Integral | A |  |  |  | 2 |
| **Unit 5**Fast Fourier Transformation | A |  |  |  | 2 |
| Total | | | | | | 32 |

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%+**two 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.