

Postgraduate Course book

Department of Mathematics

College of Education

Salahaddin University - Erbil

Subject: Advanced Mathematical Analysis

Course Book Level: M. Sc.

Lecturer's name: Assist. Prof. Dr. Rashad Rashid Haji

Academic Year: 2023 – 2024 First Semester

Course Book

1. Course name	Advanced Mathematical Analysis
2. Lecturer in charge	Assist. Prof. Dr. Rashad Rashid Haji
3. Department/ College	Mathematics / Education
4. Contact	e-mail: <u>rashad.haji@su.edu.krd</u>
	Tel: (optional)
5. Time (in hours) per week	For example Theory: 3
6. Office hours	8
7. Course code	Advanced Mathematical Analysis
8. Teacher's academic	2014-2015: Ph.D., in Mathematics, at the School of
profile	Mathematics, College of Engineering and Physical Science
	in the University of Birmingham, UK. The title of the thesis
	is: Harmonic Analysis Using Methods of Nonstandard
	Analysis. Supervised by Dr. Richard Kaye.
	2012-2013: MPhil qual (MASTER OF PHILOSOPHY), in
	Mathematics, at the School of Mathematics, College of
	Engineering and Physical Science in the University of
	Birmingham, UK. The title of the thesis is: A Nonstandard
	Approach to Fourier Series. Supervised by Dr Richard Kaye.
	1999-2000: M.Sc., in Mathematics, at the Department of
	Mathematics, College of Science in the Salahaddin
	University-Erbil, Iraq. The title of the thesis is:
	Nonstandard Approximation and Successive Shadows
	Development. Supervised by Dr. Tahir Hasan Ismail.
	1988-1989: B.Sc., in Mathematics at the Department of
	Mathematics, College of Education in the Salahaddin
	University-Erbil, Iraq.
	I am interesting in the fields of Mathematical analysis,
	Topology, Algebra and Graph Theory.
9. Keywords	Density of Rational and Irrational Numbers, Sequences
-	of Real Numbers, Metric spaces, Continuity between
	Metric spaces, Sequences of Functions.

10. Course overview:

By the end of studying of this module, the student should be able to know the following subjects: Fundamental Concepts of set theory, Family of sets, Some Special Types of Family of Sets, Set Functions, Extension of Measures, Lebesgue Measure, General set functions, Measurable Functions, Sequences of measurable functions, The Integration, Integrable Functions, Radon-Nikodym Theorem and Related Results, Space of Measurable Functions,

بەر يو بەر ايەتى دڭنيايى جۆرى و متمانەبەخشىن Directorate of Quality Assurance and Accreditation

Stochastic Processes, and Stochastic Calculus .

11. Course objective: This should not be less than 100 words

12. Student's obligation:

The attendance of students is very necessary in order to understand the subjects of the module throughout the semester, completion of all example class exercises, tests, and exams.

13. Forms of teaching:

Data show, lecture notes. We use chalk and green boards, white boards as tools of writing to explain the theoretical steps of the module to students.

14. Assessment scheme:

Throughout this Semester there are two Exams, Midterm and Final term. We set different types of questions such as: Prove or disprove, giving examples, short proves. In addition, four Quizzes during whole the term.

15. Student learning outcome:

Our aim in this module is to teach the students. They will learn the following new topics:

- 1. Fundamental Concepts of set theory
- 2. Family of sets
- 3. Some Special Types of Family of Sets
- 4. Set Functions
- 5. Extension of Measures
- 6. Lebesgue Measure
- 7. General set functions
- 8. Measurable Functions
- 9. Sequences of measurable functions
- 10. The Integration
- 11. Integrable Functions
- 12. Radon-Nikodym Theorem and Related Results
- **13. Space of Measurable Functions**
- 14. Stochastic Processes
- 15. Stochastic Calculus
- **16. Course Reading List and References:**
- [1] Burrill C., Knudson J., Real variables, Halt, Rimehart and Wiston. Inc. New York, 1966.
- [2] Royden H., Real analysis, The Macmillan co., New York, 1968.
- [3] Walter Rudin. Principles of Mathematical analysis. McGraw-Hill Book Co., New York, 1964.
- [4] Richard G., Methods of real analysis,
- [5] Apostol T., mathematical Analysis, Addison Wesley publishing co. Mass, 1957.
- [6] Walter Rudin. Real and complex analysis. McGraw-Hill Book Co., New York, second edition, 1974. McGraw-Hill Series in Higher Mathematics.

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shad Rashid Haji
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15/10/2023

19. Examinations:

1. Compositional: In this type of exam the questions usually starts with Explain how, What are the reasons for...?, Why...?, How....?

With their typical answers Examples should be provided

2. Prove or disprove the statements:

In this type of exam a short sentence about a specific subject will be provided, and then students will comment on the trueness or falseness of this particular sentence. Examples should be provided

3. state and prove the following:

In this type of exam there will be a number of phrases next or below a statement, students will match the correct phrase. Examples should be provided.

20. Extra notes:

Here the lecturer shall write any note or comment that is not covered in this template and he/she wishes to enrich the course book with his/her valuable remarks.

21. Peer review

پيداچوونەوەى ھاوەڭ

This course book has to be reviewed and signed by a peer. The peer approves the contents of your course book by writing few sentences in this section.

(A peer is person who has enough knowledge about the subject you are teaching, he/she has to be a professor, assistant professor, a lecturer or an expert in the field of your subject).

ئهم كۆرسبووكه دەبنیت لهلایهن هاوهلنیكی ئەكادیمیهوه سهیر بكریت و ناوهر وكی بابهتهكانی كۆرسەكه پەسەند بكات و جەند ووشەیهك بنووسنیت لەسەر شیاوی ناوەر وكی كۆرسەكه و واژووی لەسەر بكات. هاو مل ئەو كەسەيە كە زانباری ھەبنیت لەسەر كۆرسەكە و دەبیت پلەی زانستی له مامۆستا كەمتر نەبنیت.