



Department of Mathematics

College of Education

Salahaddin University - Erbil

Subject: Mathematical Analysis I

Course Book – Third Year

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

Academic Year: 2023 - 2024

Course Book

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| 1. Course name | Mathematical Analysis I |
| 2. Lecturer in charge | Assist. Prof. Dr. Rashad Rashid Haji |
| 3. Department/ College | Mathematics / Education |
| 4. Contact | e-mail: rashad.haji@su.edu.krd Tel: (optional) |
| 5. Time (in hours) per week | For example Theory: 3 Practical: 2 |
| 6. Office hours | 8 |
| 7. Course code | Mathematical Analysis I |
| 8. Teacher's academic profile | <p>2014-2015: Ph.D., 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: Harmonic Analysis Using Methods of Nonstandard Analysis. Supervised by Dr. Richard Kaye.</p> <p>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.</p> <p>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.</p> <p>1988-1989: B.Sc., in Mathematics at the Department of Mathematics, College of Education in the Salahaddin University-Erbil, Iraq.</p> <p style="text-align: center;">I am interesting in the fields of Mathematical analysis, Topology, Algebra and Graph Theory.</p> |
| 9. Keywords | Density of Rational and Irrational Numbers, Sequences of Real Numbers, Metric spaces, Continuity between Metric spaces, Sequences of Functions. |
| 10. Course overview: | <p>By the end of studying of this module, the student should be able to know the following subjects: The real numbers, the density of rational and irrational numbers, Sequences of real numbers, convergent sequences, bounded sequences, monotone sequences and Cauchy sequences, the relationship between these types of sequences. Metric spaces, open and closed sets, derived sets, compact sets with some important theorems. Continuity of functions between metric spaces. Sequences of functions.</p> |

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| <p>11. Course objective: This should not be less than 100 words</p> | |
| <p>12. Student's obligation: The attendance of students is very necessary in order to understand the subjects of the module throughout the academic year, completion of all example class exercises, tests, and exams.</p> | |
| <p>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.</p> | |
| <p>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.</p> | |
| <p>15. Student learning outcome: Our aim in this module is to teach the students. They will learn the following new topics:</p> <ol style="list-style-type: none"> 1- The density of rational irrational numbers on the Real line, and the role of Archimedes principle. 2- On sequences of Real numbers. 3- What is a metric space? And how to work in different metric spaces to study topological concepts such as open, closed, compact, and connected sets. 4- Continuity of functions between metric spaces in general. 5- Sequences of functions, uniform and pointwise convergence of function sequences. | |
| <p>16. Course Reading List and References:</p> <p>[1] Burrill C., Knudson J., Real variables, Halt, Rimehart and Wiston. Inc. New York, 1966.</p> <p>[2] Royden H., Real analysis, The Macmillan co., New York, 1968.</p> <p>[3] Walter Rudin. Principles of Mathematical analysis. McGraw-Hill Book Co., New York, 1964.</p> <p>[4] Richard G., Methods of real analysis,</p> <p>[5] Apostol T., mathematical Analysis, Addison Wesley publishing co. Mass, 1957.</p> <p>[6] Walter Rudin. Real and complex analysis. McGraw-Hill Book Co., New York, second edition, 1974. McGraw-Hill Series in Higher Mathematics.</p> <p>[7] د. عادل غسان نعم، مقدمة في التحليل الرياضي</p> | |
| <p>17. The Topics:</p> <p>The real numbers, the density of rational and irrational numbers, Sequences of real numbers, convergent sequences, bounded sequences, monotone sequences and Cauchy sequences, the relationship between these types of sequences. Metric spaces, open and closed sets, derived sets, compact sets</p> | <p>Lecturer's name</p> <p>Assist. Prof. Dr. Rashad Rashid Haji</p> <p>ex: (2 hrs)</p> |

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| <p>with some important theorems. Continuity of functions between metric spaces. Sequences of functions.</p> | <p>ex: 4/09/2023</p> |
| <p>18. Practical Topics (If there is any)</p> | |
| <p>In this section The lecturer shall write titles of all practical topics he/she is going to give during the term. This also includes a brief description of the objectives of each topic, date and time of the lecture</p> | <p>Assist. Prof. Dr. Rashad Rashid Haji ex: (3-4 hrs) ex: 4/09/2023</p> |
| <p>19. Examinations:</p> <p>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</p> <p>2. True or false type of exams:</p> <p>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</p> <p>3. Multiple choices: 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.</p> | |
| <p>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.</p> | |
| <p>21. Peer review پیداچوونہوہی ھاوہل</p> <p>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). ئەم کۆرسبووکە دەبیت لەلایەن ھاوہلیکی ئەکادیمیەرە سەیر بکریت و ناوەرۆکی بابەتەکانی کۆرسەکە پەسەند بکات و جەند ووشەیک بنووسیت لەسەر شیاوی ناوەرۆکی کۆرسەکە و واژووی لەسەر بکات. ھاوہل ئەو کەسەیکە زانیاری ھەبیت لەسەر کۆرسەکە و دەبیت پلەیی زانستی لە ماموستا کەمتر نەبیت.</p> | |