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**Department of Mathematics**

**College of Education**

**University of Salahaddin**

**Subject: Complex analysis I**

**Course Book – 4th year**

**First semester**

**Lecturer's name : Dr. Fryad Hisein Abdulqadr-Ph.D**

**Scientific title: Assistant professor**

**Academic Year: 2023-2024**

**Course Book**

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| **1. Course name** | **Complex analysis I** |
| **2. Lecturer in charge** | Dr. Fryad H. Abdulqadr |
| **3. Department/ College** | Mathematics\ Education College |
| **4. Contact** | E-mail: fryad.abdulqadr@su.edu.krd |
| **5. Time (in hours) per week**  | Theory: 6  |
| **6. Office hours** | Group A: Sunday:9:30-10:30 Thursday: 8:30-9:30 Group B: Sunday: 10:30-11:30 Wednesday: 12:30-2:30 |
| **7. Course code** |  |
| **8. Teacher's academic profile**  | I was born in Erbil-Kurdistan. I have got the B.Sc. degree in Mathematics from Salahaddin University-Erbil in 1997, the MSc. degree in Complex Analysis from Salahaddin University-Erbil in 2002, and the Ph.D. degree in algebra and Graph Theory from the Mosul University in 2015. My doctoral research concerned with Zero divisor graph of commutative rings. Now, I am a lecturer in Mathematics department and I teach complex analysis and its applications. |
| **9. Keywords** | Complex numbers, complex functions and analytic functions. |
| **10. Course overview:**  **Complex Analysis** is a subject which has something for all mathematicians. In addition to having applications to other parts of mathematical analysis. It has many applications in Physics such as: Fluid flow, electrical magnetism, wave equation,…etc.  In this course, we give the definition of complex numbers and some of its properties. Also we give the complex valued functions with explaining their limit, continuity and derivative.  |
| 11. Course objective: The objective of this course is to introduce the fundamental ideas of the functions of complex variables and developing a clear understanding of the fundamental concepts of Complex Analysis such as analytic functions, complex integrals and a range of skills which will allow students to work effectively with the concepts.The first objective of this course is to develop those parts of the theory that areprominent in applications of the subject. The second objective is to furnish an introduction to applications of residues and conformal mapping. With regard to residues, special emphasis is given to their use in evaluating real improper integrals, finding inverse Laplace transforms, and locating zeros of functions. As for conformal mapping, considerable attention is paid to its use in solving boundary value problems that arise in studies of heat conduction and fluid flow. Hence the book may be considered as a companion volume to the authors’ text “Fourier Series and Boundary Value Problems,” where another classical method for solving boundary value problems in partial differential equations is developed. |
| **12. Student's obligation**The student are obliged to attend to the class room. Student also enforced to make examination and discussion in the classroom.  |
| **13. Forms of teaching**The kind of teaching method includes explaining the subject and the discussion with students. |
| **14. Assessment scheme**1. There examinations will be given, each 30%
2. Daily activities (Home work, and Quiz) 10%
3. Final exam 60%‌
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| **15. Student learning outcome:** The student will be familiar with main topics in Mathematics such as: Complex numbers and analytic functions. |
| **16. Course Reading List and References‌:**1. **Churchil, R. V.**; “*Complex Variables and Applications*” , 2Ed , McGraw-Hill Book Company, Inc. New York,(1960).2. **Marsedn, J. E.** ; “*Basic Complex Analysis*”, W. H. Freeman and Company, Inc. New York,(1973).3. دوال معقدة ، قسم الفيزياء، كلية التربية ، جامعة موصل  |
| **17. The Topics:** | **Lecturer's name** |
| **Course Program**Complex numbers, Representation of complex numbers and polar coordinates, Power and roots of complex numbers, Regions in complex plain, Complex valued functions, Limits and Continuity, Analytic functions and Cauchy-Riemann Equations, Harmonic functions and its conjugates, Elementary functions, Inverse functions. | Assistant Profesor Dr. Fryad H. Abdulqadr (6 hrs) |
| **18. Practical Topics (If there is any)**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 **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 answersExamples should be provided2. True or false type of exams: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 provided3. 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. |  |
| **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 پێداچوونه‌وه‌ی هاوه‌ڵ** 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 کۆرسبووکه‌ ده‌بێت له‌لایه‌ن هاوه‌ڵێکی ئه‌کادیمیه‌وه‌ سه‌یر بکرێت و ناوه‌ڕۆکی بابه‌ته‌کانی کۆرسه‌که‌ په‌سه‌ند بکات و جه‌ند ووشه‌یه‌ک بنووسێت له‌سه‌ر شیاوی ناوه‌ڕۆکی کۆرسه‌که و واژووی له‌سه‌ر بکات.هاوه‌ڵ ئه‌و که‌سه‌یه‌ که‌ زانیاری هه‌بێت له‌سه‌ر کۆرسه‌که‌ و ده‌بیت پله‌ی زانستی له‌ مامۆستا که‌متر نه‌بێت.‌‌  |