

Ministry of Higher Education and Scientific research



**Department of ...Physics.....**

**College of ...Science.....**

**University of ...Salahaddin/ Erbil.....**

**Subject: ...Complex Analysis.....**

**Course Book – 3<sup>rd</sup> Year *Phisics*/General**

**Lecturer's name <sup>PhD</sup>Dr. Hazha Zirar Hussain**

**Academic Year: 2023/2024**

**Semester: 2**

## Course Book

<b>1. Course name</b>	<b>Complex Analysis</b>
<b>2. Lecturer in charge</b>	<b>Dr. Hazha Zirar Hussain</b>
<b>3. Department/ College</b>	<b>Physics Department/College of Science</b>
<b>4. Contact</b>	<b>e-mail: hazha.hussain@su.edu.krd</b>
<b>5. Time (in hours) per week</b>	<b>For example Theory: 3 Practical:</b>
<b>6. Office hours</b>	Sunday 10:30-12:30 Or Monday 9-1:30
<b>7. Course code</b>	
<b>8. Teacher's academic profile</b>	<p><b>2003</b> Awarded M.Sc. in Mathematics, Department of Mathematics, College of Science, University of Salahaddin-Erbil, Iraq.</p> <p><b>2003</b> Assistant lecturer at Department of Mathematics, College of Science, University of Salahaddin-Erbil, Iraq.</p> <p><b>2014</b> Awarded PhD in Mathematics, Department of Mathematics, College of Science, University of Salahaddin-Erbil, Iraq.</p>
<b>9. Keywords</b>	<b>Complex Number, Modulus, Analytic Function, Complex Integration</b>
<b>10. Course overview:</b>	Complex Analysis will cover many important materials like complex numbers and their geometric representation, harmonic functions complex integration, and it is applicable in many different subjects in pure and applied mathematics, physics and engineering.
<b>11. Course objective:</b>	The overall goal of the field of complex analysis is the study of complex numbers and its representation with elementary complex functions. Also to introduce students to the topic of Complex Analysis and some of the major issues involved, including Analytic Functions, Complex Integration with applications in physics.
<b>12. Student's obligation</b>	<ol style="list-style-type: none"> <li>Students reign an commitment to come on time and remain in the classroom for the duration of scheduled classes .</li> <li>Nothingness speak students with each other during lecture.</li> <li>All devices must be turned off.</li> <li>When teacher ask question, Students will be toriseyour hand before answer his question.</li> </ol>

<p>a.</p>	
<p><b>13. Forms of teaching</b>                  First I remember students about previous lecture, and then I start new lecture. At the end of the lecture give a note for the next lecture. During this process I am use presentation and whiteboard.</p>	
<p><b>14. Assessment scheme</b>  <i>Theoretical:</i> 40% (Midterm exams and other activities).  <i>Final Exam: Theoretical:</i> 60%</p>	
<p><b>15. Student learning outcome:</b></p> <ul style="list-style-type: none"> <li>a. Students will be learn to concept of Complex analysis.</li> <li>b. Students will be learn to find powers and roots of complex numbers..</li> <li>c. Students will be learn to find limits and integration of complex functions.</li> <li>d. Students will be learn the concept of analytic functions.</li> </ul>	
<p><b>16. Course Reading List and References:</b></p> <ol style="list-style-type: none"> <li>1) <b>Complex Variables and Applications, Seventh Edition, Jamies Ward Brown and Ruel V. Churchill, 2003.</b></li> <li>2) <b>Complex Variables, by Herb Silverman, Houghton Mifflin Company, Boston, 1975.</b></li> <li>3) <b>Elements of complex variables, by Louis L. Pennisi, Holt Rinehart Winston New York, 1976.</b></li> <li>4) <b>Applied Complex Variables for scientists and engineers, by Yue Kuen Kwok, Combridge University Press, 2010.</b></li> </ol>	
<p><b>17. The Topics:</b></p>	<p><b>Lecturer's name</b></p>
<p><b><u>Weeks 1-6: Elementary Functions:</u></b>The Exponential Function , The Logarithmic Function, Branches and Derivatives of Logarithms, Some Identities Involving Logarithms, Complex Exponents, Trigonometric Functions, Hyperbolic Functions, Inverse Trigonometric and Hyperbolic Functions.</p> <p><b><u>Week 7:</u></b> First Partial Examination.</p>	<p>This Column are not applicable because timetables of holidays will be change that is I cannot Determine a week by week review of the topics</p>

<p><b>Weeks 8-15 : Integrals:</b> Derivative of Functions, Definite Integrals of Functions, Contours, Contour Integrals, Examples, Upper Bounds for Moduli of Contour Integrals, Antiderivatives, Examples, Cauchy- Goursat Theorem, Proof of the Theorem, Simple and Multiply Connected Domains, Cauchy Integral Formula, Derivatives of Analytic Functions, Liouville's Theorem and the Fundamental Theorem of Algebra, Maximum Modulus Principle.</p> <p><b>Week 16:</b> Second Partial Examination.</p>	
<b>18. Practical Topics (If there is any)</b>	
<b>19. Examinations:</b> Questions in the examination will be arranged the matching mode by way of the examples and exercises that I give delivered in the lecture notes. Sometimes will be have extra mark in examination for worthy students.	
<b>20. Extra notes:</b>	
<b>21. Peer review</b>	