

Salisbury University Department of Mathematical Sciences

MATH 458/558 : Complex Analysis
Syllabus (Tentative)

Description: Introduction to complex variables accessible to juniors and seniors in mathematics and the physical sciences. Topics will include the algebra of the complex number system, analytic functions, contour integrals, elementary functions, sequences, series and residues. More advanced topics may include conformal mapping, the Schwarz-Christoffel transformation, integral formulas of the Poisson type and Riemann surfaces. 4 Hours Credit: Meets four hours per week.

Prerequisites: C or better in MATH 310 and in either MATH 210 or PHYS 309.

Intended Audience: Advanced undergraduate students in science and mathematics who wish to have an introduction to the theory and application of complex numbers.

Objective: To study the theory and applications of the complex number system.

Textbooks: *Complex Variables and Applications*, 8th Edition by Churchill and Brown, McGraw Hill, 2009, ISBN-13: 978-0-07-305194-9

Topic	Weeks
Complex Numbers Basic algebra, vectors, exponential form, arguments and roots.	1
Analytic Functions Mappings, limits, continuity, derivatives, Cauchy-Riemann equations, polar coordinates, harmonic functions and the reflection principle.	3
Elementary Functions Exponential, logarithmic, trigonometric, hyperbolic, inverse functions, And branches.	2
Integrals Definite and contour integrals, branch cuts, antiderivatives, the Cauchy-Goursat theorem. Simply and multiple connected domains, the Cauchy integral formula, and Liouville's theorem.	3
Series Convergence, Taylor series, Laurent series, integration and differentiation of series.	2
Residues and Poles Residues, isolated singular points, Cauchy's residue theorem, residues at poles, residues at infinity.	2
Exams and Advanced Topics	1
Total	14

Evaluation

Homework	30 – 50%
Quizzes & Exams	30 – 50%
Final Exam	0 – 25%

- Graduate students will be assigned special homework/test problems or projects.
- Clear descriptions of thought processes, evidence of critical thinking, and effective communication must be demonstrated in written work.
- **Writing Across the Curriculum:** Students will be expected to communicate mathematics and mathematical ideas effectively in speech and writing. At the University Writing Center, trained consultants are ready to help you at any stage of the writing process. In addition to the important writing instruction that occurs in the

classroom and during professors' office hours, the Center offers another site for learning about writing. **All students are encouraged to make use of these important services.**

- **NOTE:** Once a student has received credit, including transfer credit, for a course, credit may not be received for any course with material that is equivalent to it or is a prerequisite for it.