



湖北工業大學
HUBEI UNIVERSITY OF TECHNOLOGY

Course Title	Complex Analysis
Course Code	MATH 4283
Semester	Summer 2026
Course Length	8 Weeks, 60 Contact Hours
Credits	4
Instructor	TBA
Office	TBA
Email	TBA
Prerequisite	MATH 2231 Multivariable Calculus MATH 3370 Introductory Real Analysis
Antirequisite	MATH 4281 Complex Analysis (4 Weeks)

Course Description:

Introduction to complex variables. 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.

Course Goals:

Students who successfully complete this course will demonstrate competency in the following general education core goals:

- **Critical Thinking Skills** – Students will engage in analytical thinking, demonstrating the ability to critically evaluate, synthesize, and apply knowledge to complex problems, and construct well-reasoned solutions and arguments.
- **Independent Research and Inquiry** – Students will conduct independent research, utilizing academic resources to explore relevant topics, formulating research questions, analyzing data, and presenting findings in a coherent, scholarly manner.
- **Problem-Solving and Application** – Students will apply theoretical concepts and methodologies learned in the course to real-world problems, demonstrating the ability to develop practical solutions informed by academic inquiry.
- **Global and Cultural Awareness** – Students will gain awareness of the global and cultural contexts relevant to the course, appreciating diverse perspectives and considering the implications of their studies in a broader, international context.

Student Learning Outcomes:

Upon completion of this course, students will be able to:

- give an account of the concepts of analytic function and harmonic function and to explain the role of the Cauchy-Riemann equations;
- know how to evaluate complex contour integrals, and be familiar with the Cauchy integral theorem, the Cauchy integral formula, and some of their consequences;
- describe the convergence properties of a power series and determine the Taylor series or the Laurent series of an analytic function in a given region;
- know the basic properties of singularities of analytic functions, how to determine the order of zeros and poles, how to compute residues, and how to evaluate integrals using residue techniques.

Textbooks/Supplies/Materials/Equipment/ Technology or Technical Requirements:

Complex Variables and Applications, 8th Edition by Churchill and Brown, McGraw Hill, 2009.

Course Requirements:

Quizzes (10%):

Regular in-class quizzes will ensure engagement with the material. Quizzes will test understanding of fundamental concepts and key theorems.

Homework Assignments (30%):

Regular problem sets will be assigned to reinforce theoretical concepts and computational techniques. Collaboration is encouraged, but solutions must be written independently.

Midterm Exams (30%):

Students will have two non-comprehensive midterm exams covering topics including complex differentiation, contour integration, and Cauchy's theorems. The exams will include both theoretical problems and computational exercises. Each midterm exam accounts for 15% of the final grades.

Final Exam (30%):

A cumulative examination that will assess understanding of all course topics. Emphasis will be placed on problem-solving skills, applications, and critical analysis of complex functions.

Assessments: Activity	Percent Contribution
Quizzes	10%
Homework Assignments	30%
Midterm Exams (2)	30%
Final Exam	30%

Grading:

Final grades will be based on the sum of all possible course points as noted above.

Grade	Percentage of available points
A	94-100
A-	90-93
B+	87-89

B	84-86
B-	80-83
C+	77-79
C	74-76
C-	70-73
D	64-69
D-	60-63
F	0-59

Course Schedule:

The schedule of activities is subject to change at the reasonable discretion of the instructor. Minor changes will be announced in class, major ones provided in writing.

MATH 4283 Schedule		
Lecture	Topic	Readings
L1	Course Introduction Complex Numbers The Algebra of Complex Numbers Point Representation of Complex Numbers	Ch. 1
L2	Vectors and Polar Forms The Complex Exponential Powers and Roots	Ch. 1
L3	Planar Sets The Riemann Sphere and Stereographic Projection	Ch. 1 Quiz 1
L4	Analytic Functions Functions of a Complex Variable Limits and Continuity Analyticity	Ch. 2
L5	The Cauchy-Riemann Equations Harmonic Functions	Ch. 2 Quiz 2
L6	Elementary Functions Polynomials and Rational Functions The Exponential, Trigonometric and Hyperbolic Functions	Ch. 3
L7	The Logarithmic Function Washers, Wedges, and Walls	Ch. 3
L8	Complex Powers and Inverse Trigonometric Functions	Ch. 3 Quiz 3
L9	Complex Integration Contours Contour Integrals	Ch. 4
L10	Independence of Path Cauchy's Integral Theorem	Ch. 4
L11	Cauchy's Integral Formula and Its Consequences Bounds for Analytic Functions	Ch. 4 Quiz 4
/	Midterm Exam 1	Ch. 1-4
L12	Series Representations for Analytic Functions Sequences and Series Taylor Series	Ch. 5
L13	Power Series Mathematical Theory of Convergence	Ch. 5
L14	Laurent Series	Ch. 5
L15	Zeros and Singularities	Ch. 5

L16	The Point at Infinity Residue and Poles The Residue Theorem Trigonometric Integrals	Quiz 5 Ch. 6
L17	Residues at Poles Zeros of Analytic Functions	Ch. 6 Quiz 6
/	Midterm Exam 2	Ch. 5-6
L18	Applications in Residues Improper Integrals of Certain Functions Improper Integrals Involving Trigonometric Functions	Ch. 7
L19	Indented Contours Integrals Involving Multiple-Value Functions	Ch. 7
L20	Improper Integrals from Fourier Analysis Jordan's Lemma	Ch. 7 Quiz 7
L21	The Argument Principle and Rouché's Theorem	Ch. 7
L22	Mapping by Elementary Functions Linear Transformations Linear Fractional Transformations	Ch. 8
L23	Mappings of the Upper Half Plane Square Roots of Polynomials	Ch. 8
L24	Riemann Surfaces Surfaces for Related Functions	Ch. 8 Quiz 8
L25	Conformal Mapping Preservation of Angles Local Inverses	Ch. 9
/	Final Exam	Ch. 1-9

Accommodation Statement:

Academic accommodations may be made for any student who notifies the instructor of the need for an accommodation. It is imperative that you take the initiative to bring such needs to the instructor's attention, as he/she is not legally permitted to inquire. Students who may require assistance in emergency evacuations should contact the instructor as to the most appropriate procedures to follow.

Academic Integrity Statement

Each student is expected to maintain the highest standards of honesty and integrity in academic and professional matters. The University reserves the right to take disciplinary action, up to and including dismissal, against any student who is found guilty of academic dishonesty or otherwise fails to meet the standards. Any student judged to have engaged in academic dishonesty in coursework may receive a reduced or failing grade for the work in question and/or for the course.

Academic dishonesty includes, but is not limited to, dishonesty in quizzes, tests, or assignments; claiming credit for work not done or done by others; hindering the academic work of other students; misrepresenting academic or professional qualifications within or without the University; and nondisclosure or misrepresentation in filling out applications or other University records.

Other Items:

Attendance and Expectations

All students are required to attend every class, except in cases of illness, serious family concerns, or other major problems. We expect that students will arrive on time, be prepared to listen and participate as appropriate, and stay for the duration of a meeting rather than drift in or out casually. In short, we anticipate that students will show professors and fellow students maximum consideration by minimizing the disturbances that cause interruptions in the learning process. This means that punctuality is a must, that cellular phones be turned off, and that courtesy is the guiding principle in all exchanges among students and faculty. You will be responsible for the materials and ideas presented in the lecture.

Assignment Due Dates

All written assignments must be turned in at the time specified. Late assignments will not be accepted unless prior information has been obtained from the instructor. If you believe you have extenuating circumstances, please contact the instructor as soon as possible.

Make-Up Work

The instructor will not provide students with class information or make-up assignments/quizzes/exams missed due to an unexcused absence. Absences will be excused and assignments/quizzes/exams may be made up only with written documentation of an authorized absence. Every effort should be made to avoid scheduling appointments during class. An excused student is responsible for requesting any missed information from the instructor and setting up any necessary appointments outside of class.

Access, Special Needs, and Disabilities

Please notify the instructor at the start of the semester if you have any documented disabilities, a medical issue, or any special circumstances that require attention, and the school will be happy to assist.