

Math 42500: Elements of Complex Analysis
(Class No: 23411)
Math 52500: Introduction to Complex Analysis
(Class No: 21740)

Prerequisite: Math 26100; also Math 30000, or another upper level math or similar course.

Meets: MW 3:00-4:15p in LD 002

Final Exam:, Friday, December 14, 3:30-5:30p

Instructor: Carl Cowen

Office: LD 224P

Phone: 278-8846

Office Hours: M 12:15-2:00p, Tu 10:00-11:30a and 3:30-4:45p, or by appointment

E-mail: ccowen@iupui.edu

URL: <http://www.math.iupui.edu/~ccowen/Math425-525.html>

General Information

Complex Analysis, or the Theory of Functions of a Complex Variable, is a central topic in analysis at an advanced level. It is analogous to real analysis, but also quite different from real analysis, because complex differentiable functions are much more special than real differentiable functions. One goal of this course will be explaining how complex valued functions are so different and why. Because of these differences, each of real and complex analysis are fundamental parts of analysis.

Moreover, complex analysis is important in many applications of mathematics to engineering and science and also linked closely to other parts of mathematics as well. For example, complex analysis is used to understand air flow, fluid flow more generally, and parts of engineering and science related to more abstract versions of flow that occur in electric and magnetic fields and quantum mechanics. Applications and connections in mathematics itself may be found in algebraic geometry, number theory, and the geometry of manifolds. The main goals of the course are to make some of these connections apparent to you, to help you develop an appreciation of the power of the function theoretic point of view, and to help you add complex analysis to your mathematical toolbox.

Students taking Math 42500 are typically undergraduate math majors and students taking Math 52500 are typically engineering graduate students. The classes meet together because the students in these two groups are typically close to each other in their mathematical experience and there are not two types of complex analysis to learn at this level. The goals of this course are to cover both the basic theoretical ideas of complex analysis, give experience in making theoretical arguments (proofs), and also provide connections of these ideas to some of the applications. The homework and testing policies (see below) have been chosen to reinforce these goals.

The necessary background for success in this class is calculus in one and several variables, courses like differential equations that use applications of calculus ideas, and some experience using mathematics in applications in engineering or science or in giving explanations of mathematical ideas in a new context. This is a class describing applicable mathematics and we will occasionally mention some specific applications, but direct applications are not the main focus of the class.

TEXT: There will be NO official text for the course, but any edition of *Fundamentals of Complex Analysis with Applications...* by Edward Saff and Arthur D. Snider OR *Complex Variables and Applications* by R.V. Churchill and J.W. Brown will be fine for this course.

The assignments will be handed out in class and we will cover most of the topics in these books. Both of these books will be on reserve in the library.

Communication

Besides communication in class, assignments and other course information will be posted on the course website <http://www.math.iupui.edu/~ccowen/Math425-525.html> and also posted on Canvas and One.IU. Email is a good way to communicate with me and there may be important course details emailed to you at your IUPUI email address. Office hours are also a good way to get questions answered or get more information than was discussed in class. The office hours are noted above, but if those are not convenient for you, please ask for an appointment that would be possible for discussion about the ideas of the course.

Grading Policies

There will be two one-hour tests, each counting a little more than 20% of your grade, and about 45% of your grade will come from the two-hour final exam given December 14. There will be a quiz on 'complex arithmetic' early in the semester that will count about 5% of your grade and the remaining 6 to 8% will come from grades on your weekly homework. You will *not* be permitted to have books, notes, calculators, phones, or watches during Tests in this class!

The grading scale for this class will be approximately A: 85-100%; B: 65-85%; and C: 50-65%.

Some Important Dates

August 20	First day of classes
August 26	Last day to withdraw with no record
September 3	Labor Day, no classes
Early October	Test 1 over chapters 1-4 (SS) or 1-5 (CB)
October 15, 16	Fall Break, no classes
October 21	Last day to withdraw
Late November	Test 2 over chapters 5 & 6 (SS) or 6 & 7 (CB)
November 21-25	Thanksgiving Break!! no classes
December 10	Last day of classes
December 14	Final Exam over all parts of the course

General Academic Policies

The work you submit for homework, quizzes, tests, and exams must be your own. For homework, you will probably find it beneficial to consult with other students about the material and this kind of conversation and collaboration is encouraged. At the end of the consultation, however, each participant is expected to prepare their own summary of the discussion and their own solution to the problem. More information about student conduct can be found at

<http://studentcode.iu.edu>

Information concerning adaptive services for learning or other disabilities at IUPUI can be found at

<https://diversity.iupui.edu/offices/aes/index.html>

The policies for this class will be those derived from IUPUI's policies on academic conduct and adaptive services.

Information about withdrawal from a class or from IUPUI (with grade of 'W' if before October 21) can be found at

<http://registrar.iupui.edu>

and a description of administrative withdrawal can be found at

<https://studentcentral.iupui.edu/register/administrative-withdrawal.html>

Administrative Withdrawal: A basic requirement of this course is that you will participate in all class meetings and conscientiously complete all required course activities and/or assignments. Keep in touch with me if you are unable to attend, participate, or complete an assignment on time. If you miss more than half of the required activities within the first 25% of the course without contacting me, you may be administratively withdrawn from this course. Example: Our course meets twice per week; thus if you miss more than four classes in the first four weeks, you may be withdrawn. Administrative withdrawal may have academic, financial, and financial aid implications. Administrative withdrawal will take place after the full refund period, and if you are administratively withdrawn from the course you will not be eligible for a tuition refund. If you have questions about the administrative withdrawal policy at any point during the semester, please contact me.

After the conclusion of the 100% refund period for the relevant term or session

<https://studentcentral.iupui.edu/pay-bill/index.html>

all individuals attending classes on a regular basis MUST be officially enrolled in the class, attending the class based on formal arrangements to make up a prior grade of Incomplete, or enrolled as an auditor. One time visitors to classes may be allowed only on an exception basis with prior permission of the instructor. This policy does not apply to individuals who provide assistance to a student with a documented disability, such as Adaptive Educational Services sign language interpreters, individuals who are involved in the course in an instructional role, or administrative personnel.