MAT 342 Applied Complex Analysis, Fall 2024.

- **Course description:** The course covers complex numbers, analytic functions, the Cauchy-Riemann and Laplace equations, the Cauchy integral formula and applications. Fundamental Theorem of Algebra and the Maximum Principle. The Cauchy residueheorem and applications to evaluating real integrals. Conformal mappings. Students should be able to work with these concepts and use them in basic applications.

In calculus (and more rigorously in real analysis), one learns how to understand functions of real variables at the level of the infinitesimal, allowing one to take derivatives and integrals. One may ask whether this calculus extends in a natural way to the setting of complex numbers. We will see that not only is this possible, but that the notion of being complex differentiable is actually quite strong, from which one may draw an immense number of powerful conclusions which are useful throughout mathematics of all flavors, pure and applied.

This is a mathematically rigorous course. While the focus is on calculations and applications, complete mathematical arguments and explanations will be expected. (The proofs course MAT 200 is an advisory prerequisite; familiarity with constructing proofs is desirable but not required.)

- **Prerequisites:** C or higher in the following: MAT 203 or MAT 220 or MAT 307 or AMS 261. Advisory Prerequisite: MAT 200 or MAT 250.

- **Instructor:** Olga Plamenevskaya, office 2-112 Math, email: `olga@math.stonybrook.edu`
- **Office hours:** Wednesday 12:30-3:30pm, or by appointment.

- **Grader:** Ze Yun, email: `zeyun@stonybrook.edu`, office hours.
- **Class meetings:** MW, 9:30-10:50am, Earth and Space 131.

- **Textbook:** J.Brown, R.Churchill, *Complex Variables and Applications*, 9th edition. This is the required text. Students should read the assigned sections before class (see schedule below).

- **Exams:** there will be one midterm exam in class (TBA) and a final exam. The final exam is scheduled for **December 11, 11:15am-1:45pm.**

- **Quizzes:** there will be several short quizzes during the semester.

- **Grading policy:** your final grade will computed based on: homework 15%, quizzes 15%, midterm exam 30%, final exam 40%. Class attendance and participation are important and will be taken into consideration (in favor of the student) for borderline cases of semester grades. Make-ups for missed final exam will only be given in cases of properly documented extraordinary circumstances outside of student's control. No make-ups will be given for missed midterm, but in cases of properly documented extraordinary circumstances the affected student will be excused from the missed midterm and receive the semester grade based on 70% final exam.

- **Homework:** weekly assignments and week-by-week schedule of topics will be posted on this page as the course progresses. Only select homework questions will be graded; ungraded questions will only be checked for completion (for small credit).

Important: Give complete explanations or proofs for all homework questions, show all work. Please write up your solutions neatly, be sure to put your name on the first page and staple all pages. Illegible homework will not be graded. If collaborating with other students or using any other resources, your solutions should be written up in your own words, and all your collaborators and sources should be acknowledged (see academic integrity policy below). No late homework is accepted.

- **Week-by-week schedule:**

Week 1. Sections 1-9: definition and algebraic properties of complex numbers, complex numbers and vectors, complex conjugate, exponential form, argument and modulus. You should be able to add, subtract, multiply, and divide complex numbers, show that a given expression defines a complex number by redusing it to the form a + bi, plot complex numbers on the complex plane, express them in exponential form, find argument and modulus, find and plot the complex conjugate of a given number, and be able to work with basic properties of complex numbers. **Read the textbook!**

Homework 1, due Wednesday, Sept 4: TBA

Academic Integrity Statement Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty is required to report any suspected instances of academic dishonesty to the Academic Judiciary. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at http://www.stonybrook.edu/commcms/academic_integrity/index.html.

Critical Incident Management Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Student Conduct and Community Standards any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures. Further information about most academic matters can be found in the Undergraduate Bulletin, the Undergraduate Class Schedule, and the Faculty-Employee Handbook.

Student Accessibility Support Center Statement If you have a physical, psychological, medical, or learning disability that may impact your course work, please contact the Student Accessibility Support Center, Stony Brook Union Suite 107, (631) 632-6748, or at sasc@stonybrook.edu. They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential.