MATH 485: Complex Analysis, Fall 2019

Class Meetings: MWF at 11:00-11:50 in **Stetson Court 109**
Instructor: Andrew Bydlon
Email: atb4@williams.edu
Office Hours: Monday, 1:45-2:45, Tuesday 1:30-2:30, Wednesday 2:30-3:30 in **Bascom 303**

https://calendar.google.com/calendar/selfsched?sstoken=
UUZPQmhwVVpJdWV6fGRlZmF1bHR8YzA0MzViNTM5MTYwMjM5NzkxZjMzOTI0Y2IxYmNlYjA

Text: Complex Analysis, by **Elias Stein and Rami Shakarchi**.

Prerequisite Information: One should have completed *Real Analysis*, with particular focus on the formalities of differentiation and integration.

Course Description: We will study functions with a complex domain. In particular, we will focus on the questions of when they are differentiable and integrable in a particular domain. The second half will be focused on particular cases, such as Γ and ζ, as well as conformal mappings.

Here is a broad list of topics which we will cover throughout the course. The indicated time frames are approximate and subject to change.

1. **The Complex Plane (Chapter 1):** Representations for complex numbers, conjugates, complex domains, continuous functions, holomorphic functions, integration on curves. (2 Weeks)
2. **Cauchy's Theorem (Chapter 2):** Goursat's theorem, integrals, Cauchy's integral formula, the fundamental theorem of algebra, applications. (2 Weeks)
3. **Meromorphic Functions (Chapter 3):** Zeros and poles, the residue theorem, types of singularities, the argument principle, the complex logarithm and branch cuts. (2 Weeks)
4. **Fourier Transform (Chapter 4):** Fourier inversion, Poisson summation formula, functions in $\mathfrak{F}$, the Paley-Weiner theorem. (1 Week)
5. **Entire Functions (Chapter 5):** Jensen's formula, orders of growth, infinite products, Hadarmard's factorization theorem. (2 Weeks)
6. **Gamma and Zeta Functions (Chapter 6):** Analytic continuation, properties, the functional equation. (1 Week)
7. **Conformal Mappings (Chapter 8):** Conformal equivalence, Schwartz lemma, Riemann mapping theorem, polygons. (2 Weeks)

Glow: I will use GLOW as a method of communication, as well as a gradebook. Notes may also be available here in the Files subheader after each class.

Grading: The following are the grade components and the percentage each contributes to the final grade:

- **Homework Assignments (40%)**- There will be weekly homeworks, of which the lowest score will be dropped. These will be due **Wednesday** of each week, approximately 10 throughout the semester.
- **Midterm (30%)** There will be 1 midterm for the course, which will occur in class on **October 21st**.
- **Final Exam (30%)**- The final will be a 24-hour self-scheduled exam during finals week.

Note: The instructor retains the right to modify this grading scheme during the course of the semester; students will, of course, be well notified of any adjustments.