

The course will familiarize the students with complex analysis and its plethora of applications in mathematics, physics, and engineering. Topics will include:

1. **Introduction to Complex Analysis:** Complex numbers, functions, conformal mappings.
2. Laurent series, differentiation.
3. Contour integration and residue theory, the fundamental theorem of algebra.
4. **Fourier Analysis:** orthogonality, Fourier Series, Fourier transforms.
5. Applications to Partial Differential Equations (including heat and wave equations).
6. **Signal processing:** Nyquist sampling theorem, Fast Fourier Transform.
7. Time-permitting: Abel's impossibility theorem.

- Previous requirements: familiarity with complex numbers, knowledge of calculus, familiarity with partial differential equations

- Note that although the course will not focus on mathematical rigor, familiarity with formal proofs is recommended.

- Most exercises will be theoretical, but there will be some numerical exercises (which can be done in MATLAB or any other programming language).

### **Lectures:**

- Mondays and Wednesdays 4:30–5:45pm at Maxwell-Dworkin G115

**Section times and location:** Pick one of two times to attend. There will be no new material covered in section but we will share helpful tips to solidify your understanding. We will meet in Maxwell-Dworkin G125 at

- Wednesdays 6:00–7:00pm, OR
- Thursdays 4:30–5:30pm

### **Office hours:**

- Ariel Amir ([arielamir@seas.harvard.edu](mailto:arielamir@seas.harvard.edu))
  - Office hours: Mondays 10:00am–12:00pm at Pierce 321.
  - On Mon, Oct 4, OH will be held remotely on [Zoom](#).
- TF: Jeffrey Chang ([jeffrey\\_chang@g.harvard.edu](mailto:jeffrey_chang@g.harvard.edu))
  - Office hours: Tuesdays 7:00pm–8:00pm at Boylston G02, AND
  - Office hours: Fridays 1:30pm-2:30pm at Lowel Lecture Hall, B-15
  - On Fri, Oct 1 and Fri, Oct 29, OH will be held remotely on [Zoom](#).
- TF: Nick Derr ([derr@g.harvard.edu](mailto:derr@g.harvard.edu))
  - Office hours: Wednesdays 1:30–2:30pm at Maxwell-Dworkin 119
  - On Wed, Sep 22, OH will be held remotely [on Zoom](#). Other weeks will be held in-person only.

**Textbooks:** We won't strictly be following any book, but we will refer to the following books as references. You can find these textbooks for free on [hollis.harvard.edu](http://hollis.harvard.edu).

- Brown and Churchill, Complex Variables and Applications
- Arfken, Mathematical Methods for Physicists

**Homeworks:** We will have weekly problem sets, handed out Wednesdays and due the following Wednesday at noon. Please submit assignments electronically as a pdf file on Canvas. As usual, you are encouraged to discuss the problems together with your classmates and help each other understand the material, but anything you write up must be your own work. For grading, we will ignore the two problem sets with the lowest grade (i.e. you may also choose not to submit two psets during the semester).

**Quiz:** To check your understanding, we will have two short quizzes during class times on the following dates. The content will be similar to what you have done in the homeworks (but shorter). You will be permitted a single double-sided letter sheet of paper of notes.

- Monday, October 4 in class
- Monday, November 1 in class

**Final:** Saturday, December 11 at 2:00pm at **Science Center A**

**Grading:**

- 50% weekly problem sets (only top 10 of 12 are counted)
- 10% quiz 1
- 10% quiz 2
- 30% final exam

Grade cutoffs:

0.0	F
60.0	C
65.0	C+
70.0	B-
75.0	B
80.0	B+
85.0	A-
92.5	A
97.5	A+