



**Mathematics for Electrical Engineers – EE 250**  
*Schaefer School of Engineering & Science*  
Fall 2021

Meeting Times: Weekly: Monday/Wednesday/Friday | 9:00 AM - 9:50 AM  
Classroom Location: **Gateway North GN303**  
Instructor: Serban Sabau  
Contact Info: Burchard 214, [ssabau@stevens.edu](mailto:ssabau@stevens.edu), 201-216-5615  
Office Hours: Weekly: Fridays 3 pm - 4.30 pm  
Prerequisite(s): Freshman Year Calculus

### **COURSE DESCRIPTION**

This course introduces the student mathematical logic and formal methods of proof. The main scope of the course is the study of analytic functions of a complex variable and fundamental results such as the Cauchy-Riemann equations, Taylor series, (contour) integration in the complex plane, the Cauchy Integral formula, Laurent series, residues, the Residues Theorem and Liouville's Theorem. Complex variable functions are the central mathematical objects needed in the following semesters for the study (of the frequency domain analysis of) signals and systems, which represent the core of any E.E. curricula.

The course is specifically designed to be as self-contained as possible, while at the same time providing complete proofs for almost all the results taught in class. While mathematical rigor is not a scope in itself, it is intently embraced as an irreplaceable intellectual ability.

### **LEARNING OBJECTIVES**

**After successful completion of this course, students will be able to...**

- Read and write rigorously mathematical proofs of a mild level of difficulty;
- Understand well the notions of limit, continuity and differentiability for functions of a complex variable;
- Get a brief introduction into the topology of the Complex Plane;
- Compute contour integrals and Laurent series expansions;
- Get a good understanding of the Residues Theorem and its computational applications.

## FORMAT AND STRUCTURE

- This course is comprised of weekly lectures, periodic homework, midterms and a final exam.

## COURSE MATERIALS

### Textbook(s):

DISCRETE MATHEMATICS AND ITS APPLICATIONS, Fifth Edition, 2003,  
**(not required, use instructor's notes)**

Kenneth H. Rosen  
ISBN: 0-390-39579-X,  
McGraw Hill

COMPLEX VARIABLES AND APPLICATIONS, Ninth Edition, **(required)**

James Ward Brown, & Ruel V. Churchill  
ISBN 978-0-07-305194-9  
MHID 0-07-305194-2  
McGraw Hill Higher Education

**Materials:** All other materials and instructor's handwritten notes will be uploaded to the course website (Canvas).

## COURSE REQUIREMENTS

- Attendance** Students are not only strongly encouraged but required to attend all lectures. Excused absences (religious or medical, noted in via email to the professor prior to the absence occurring) must be accompanied by proper documentation.
- Homework** There will be at least seven homework written assignments throughout the semester. The due date of each assignment is usually one week after the date when the homework is posted on Canvas or assigned in class. Homework is due in .pdf format, usually before the beginning of class. *Please use an adequate app to turn the pictures of your written HWs into high-contrast .pdf files that would make them more readable!*
- Exams** Reading assignments must be treated just as thoroughly as written assignments. There will be at least two mid-term exams and a final exam for this course. The mid-term exam counts for 40% of the final grade, and the final exam will be 45% of the final grade. The final exam is cumulative! There will be review sessions the week before the exams. There are NO makeup exams. Excused absence from any exam shall seek consent from the instructor prior to the exam day; rearrangement will be scheduled as appropriate.

## GRADING PROCEDURES

Grades will be based on:

Class Participation	(5%)	50 points
Homework	(10%)	100 points
Mid-term Exams	(45%)	400 points
Final Exam	(40%)	450 points
Total	100%	1000 points

**Note:** Some students may feel that the grades obtained throughout the semester for the “in class” midterm or final exams do not accurately reflect their understanding of the material. These occurrences are part of the academic experience and tend to balance themselves out in the long run. As a general rule, “do over”-s for the in class exams are not possible.

## ACADEMIC INTEGRITY

### Student Code of Academic Integrity

*All Stevens students promise to be fully truthful and avoid dishonesty, fraud, misrepresentation, and deceit of any type in relation to their academic work. A student's submission of work for academic credit indicates that the work is the student's own. All outside assistance must be acknowledged. Any student who violates this code or who knowingly assists another student in violating this code shall be subject to discipline.*

## EXAM ROOM CONDITIONS

The following procedures apply to quizzes and exams for this course. As the instructor, I reserve the right to modify any conditions set forth below by printing revised Exam Room Conditions on the quiz or exam.

1. Students may use the following devices during quizzes and exams. Any electronic devices that are not mentioned in the list below are not permitted.

Device	Permitted?	
	Yes	No
Laptops		X
Cell Phones		X
Tablets		X
Smart Watches		X
Google Glass		X
Other (electrically powered devices)		X

2. Students may use the following materials during quizzes and exams. Any materials that are not mentioned in the list below are not permitted.

Material	Permitted?	
	Yes	No
Handwritten Notes		X
<u>Handwritten</u> Cheat Sheet <i>Conditions: one letter sized sheet (front and back),</i>	X	
Textbooks		X
Readings		X

3. Students are not allowed to work with or talk to other students during quizzes and/or exams.

### **TENTATIVE COURSE SCHEDULE**

The following is a tentative course schedule. Any changes to this schedule will be communicated to you 1) in class and/or 2) via email. The Canvas shell for this course will always be kept up-to-date so you can always reference the “Assignments” tab for accurate due dates.

**Week 1&2** – Review (Complex Numbers, Rudiments of Calculus), Logic, Propositional Equivalences, Predicates and Quantifiers, Sets, Set Operations, Functions (*Instructor provided Notes* )

**Week 3,4 ,5 &6** – Rudiments of Topology in the Complex Plane, Analytic Functions, Derivatives, Cauchy-Riemann Equations, Sufficient Conditions for Differentiability

**Week 7,8,9 & 10** – Contours, Contour Integrals, Cauchy Integral Formula, Derivatives of Analytic Functions, (Liouville's Theorem), Maximum Moduli of Functions

**Week 11&12** – Taylor & Laurent Series, Residues & Residue Theorems, Residues at Poles

**Week 13&14** - Applications of Residues, Evaluation of Improper Integrals

**Note:** *It is very important that you take the initiative and contact the instructor as soon as you feel that your understanding of the lectures or your ability to do homework (without outside help) is suffering. For many students this may happen early on into the semester, usually around the time that the “epsilon” definition of the limit of sequences is taught (or the introduction to the topology of the complex plane).*

## **LEARNING ACCOMMODATIONS**

Stevens Institute of Technology is dedicated to providing appropriate accommodations to students with documented disabilities. The Office of Disability Services (ODS) works with undergraduate and graduate students with learning disabilities, attention deficit-hyperactivity disorders, physical disabilities, sensory impairments, psychiatric disorders, and other such disabilities in order to help students achieve their academic and personal potential. They facilitate equal access to the educational programs and opportunities offered at Stevens and coordinate reasonable accommodations for eligible students. These services are designed to encourage independence and self-advocacy with support from the ODS staff. The ODS staff will facilitate the provision of accommodations on a case-by-case basis.

### ***Disability Services Confidentiality Policy***

Student Disability Files are kept separate from academic files and are stored in a secure location within the Office of Disability Services. The Family Educational Rights Privacy Act (FERPA, 20 U.S.C. 1232g; 34CFR, Part 99) regulates disclosure of disability documentation and records maintained by Stevens Disability Services. According to this act, prior written consent by the student is required before our Disability Services office may release disability documentation or records to anyone. An exception is made in unusual circumstances, such as the case of health and safety emergencies.

For more information about Disability Services and the process to receive accommodations, visit <https://www.stevens.edu/office-disability-services>. If you have any questions please contact: Phillip Gehman, the Director of Disability Services Coordinator at Stevens Institute of Technology at [pgehman@stevens.edu](mailto:pgehman@stevens.edu) or by phone (201) 216-3748.