

Course: **Advanced Engineering Mathematics I (AEM I)**  
Instructor: Dr. Laura K. Gross  
Office: Arts and Sciences (CAS) 266  
Office phone: (330) 972-6829  
Department phone: (330) 972-7400  
Fax: (330) 374-8630  
**(Be sure to put my name on the document.)**  
E-mail: gross@math.uakron.edu  
Web: <http://www.math.uakron.edu/~gross>  
Texts: *Schaum's Outline of Theory and Problems of Advanced Mathematics for Engineers and Scientists* [1] (optional),  
*Advanced Engineering Mathematics* [2] (optional)

- **Objectives.** The course covers mathematical topics applicable to science and engineering. Objectives include learning about mathematical subjects new to you (like complex variables) and extending your knowledge of prerequisite fields (like calculus, ordinary differential equations (ODEs), and linear algebra). You will develop mathematical sophistication by learning how subjects form a coherent structure. For example, a unit on linear analysis will integrate your prior understanding of linear algebra with your prior understanding of linear ODEs. You will develop knowledge and mathematical maturity for further work, with applications providing motivation along the way.
- **Texts and resources.** Succinct outline [1] is a reference book and contains many worked problems. You may purchase it if you like. Supplement it with any textbooks on complex variables, linear algebra, differential equations, and calculus. At the Science and Technology Library you can find many such books on the shelves, as well as on course reserve at the circulation desk. **Ask for the reserved books either by call number or, in some cases, as my personal copy.** (See list below.) Use them for two hours at a time in the library.

If you wish, you may buy any of the many detailed reference books on advanced engineering mathematics. They are similar to [2], which is now available in a sixth edition from Thomson publishers (2007). For your information, such books also cover many of the topics from AEM II, such as series solutions for ODEs, special functions, Sturm-Liouville theory, Fourier series and transforms, and partial differential equations (PDEs). **(OVER)**

I have various editions of AEM and specific-topic books in my office available for free on a first-come-first-served basis. I can also lend books.

I have posted a **popular-science article on complex numbers** on the **course web page** (which includes a chat room and discussion board). You can link to it from my homepage (URL above). I will announce the password for the course web page in class.

- **Course grades.** Course grades will consist of 25% homework, 75% three equally-weighted exams (two midterms and a final).
- **Registration.** You must register during the first two weeks of school. To participate in the class, your name must appear the university's official class list by Monday, September 10, 2007.
- **Withdrawal.** Withdrawal from the course is permitted at any time on or before Friday, October 19, 2007 with your advisor's signature. After that date, my signature is also required. After Friday, November 16 at 4:30, University policy prohibits withdrawal from any class. All withdrawals must be processed by the registrar by that date.

- **Tentative schedule.**

Week	Dates	Topics
1-3	August 27–September 10	Complex variables
5	September 28	EXAM 1
3-8	September 12–October 15	Linear analysis
10	November 2	EXAM 2
8-11	October 17–November 7	Systems of ODEs
11-15	November 9–December 7	Vector calculus
16	December 10, 4:00–5:55	FINAL EXAM

- **Tentative office hours.** <sup>1</sup>

- **Mondays and Wednesdays:** 1:10–2:00 p.m.
- **Tuesdays:** 10:45–11:45 a.m. and 1:15–3:15 p.m.
- **Fridays:** 10:45 a.m.–11:45 a.m. and 1:10–2:00 p.m.

- **Academic honesty.**

- Feel free to work together on homework. However, you must *write up by yourself* all homework that will be graded.

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<sup>1</sup>Please see my web site for office-hour updates. I am available for appointments, too, preferably made a day in advance.

- Familiarize yourself with University academic honesty policies (attached), and follow them closely.

## References

- [1] Murray R. Spiegel. *Schaum's Outline of Theory and Problems of Advanced Mathematics for Engineers and Scientists*. McGraw-Hill, New York, 1971. **Personal copy**.
- [2] Peter V. O'Neil. *Advanced Engineering Mathematics*. Brooks/Cole Publishing Company, Pacific Grove, CA, 4th edition, 1995. **TA330 .O53 1995**.
- [3] E. B. Saff and A. D. Snider. *Fundamentals of Complex Analysis for Mathematics, Science, and Engineering*. Prentice-Hall, Inc., Englewood Cliffs, NJ, 2nd edition, 1993. **QA300 .S18 1993**.
- [4] A. David Wunsch. *Complex Variables with Applications*. Addison-Wesley Publishing Company, Reading, MA, 2nd edition, 1994. **QA331.7 .W86 1994**.
- [5] Ruel V. Churchill and James W. Brown. *Complex Variables and Applications*. McGraw-Hill Book Company, New York, 6th edition, 1996. **QA331.7 .C524 1996**.
- [6] Donald L. Kreider, Robert G. Kuller, Donald R. Ostberg, and Fred W. Perkins. *An Introduction to Linear Analysis*. Addison-Wesley Publishing Company, Inc., Reading MA, 1966. **QA402 .K7**.
- [7] Seymour Lipschutz. *Schaum's Outline of Theory and Problems of linear algebra*. McGraw-Hill, New York, 1968. **QA251 .L53 1968**.
- [8] Gareth Williams. *Linear Algebra with Applications*. Jones and Bartlett Publishers, Sudbury, MA, 4th edition, 2001. **QA184 .W53 2000**.
- [9] William E. Boyce and Richard C. Diprima. *Elementary differential equations and boundary value problems*. J. Wiley, New York, 6th edition, 1997. **QA371 .B773 1997**.
- [10] Frank Ayres. *Schaum's Outline of Theory and Problems of Differential and Integral Calculus*. Schaum Publishing Company, New York, 1964. **QA303 .A96 1964x**.
- [11] James Stewart. *Calculus*. Brooks/Cole Publishing Company, Pacific Grove, 4th edition, 1999. **Personal copy**.