AMES 5101: Engineering Analysis

(cross-listed as ENGR 5314: Advanced Engineering Mathematics)

Credits: 3 Credits, 3 contact hours/week

Instructor: David A. Tonn, Ph.D. (davet@engr.uconn.edu)

Textbook: Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, ISBN 978-0470458365.

Oracle Hours : Online by arrangement

Catalog Description: Advanced math topics including Laplace, Fourier and z-Transform methods, probability theory, ordinary differential equations and systems of ODEs, partial differential equations, vector calculus, elements of statistics, linear and non-linear optimization, matrix theory, and special functions like Bessel, Legendre, and gamma. This course is set up as modules. Students will be required to complete certain modules depending on their background and concentrations.

Grading Breakdown :

Quiz I	15 %
Quiz II	15 %
Homework	40 %
Research Project	30 %
Total	100 %

General Policies :

- There will be a series of homework assignments over the course of the semester, and the total of your homework scores will count for 40% of the total course grade. Please pay attention to due dates.

- Homework assignments will be administered. through HuskyCT. The assignment sheet will be posted there and there will be a "dropbox" where your assignment can be uploaded to. Please complete the assignment on paper and scan (200 dpi, greyscale) prior to uploading.
  - Please show all work on homework solutions; this way, partial credit can be given. Unless otherwise noted, no credit will be given for an answer alone.
  - Late assignments will be accepted but at a penalty of 10% per calendar day late.
  - Homework submissions will not be accepted beginning 1 week after the due date; this is because the solutions will have been posted to HuskyCT by this point.

- Cheating and/or any other form of academic dishonesty will not be tolerated under any circumstances and will be dealt with in accordance with University policy. Everyone is expected to do their own work and submit their own assignment in their own hand.

Course Schedule

There are two "tracks" through this course, depending on your major field of study. If you are in the Masters of Engineering program concentrating in Mechanical, General, or Civil Engineering or in the ME or CE program, you will follow "Track A". If you are in Computer Science or Electrical and Computer Engineering, or MEng concentrating in ECE, you will follow "Track B".

Week #	Week of	Track A	Track B	Exams
1	August 27	Unit 1	Unit 1	
2	September 3	Unit 1	Unit 1	
3	September 10	Unit 1	Unit 1	
4	September 17	Unit 2	Unit 2	
5	September 24	Unit 2	Unit 2	
6	October 1	Unit 2	Unit 2	Quiz 1
7	October 8	Unit 3	Unit 3	
8	October 15	Unit 3	Unit 3	
9	October 22	Unit 4	Unit 5	
10	October 29	Unit 4	Unit 5	
11	November 5	Unit 4	Unit 5	Quiz II
12	November 12	Unit 6	Unit 7	
13	November 26	Unit 6	Unit 7	
14	December 3	Unit 6	Unit 7	Research Paper Due

On the next page you'll find a table describing the topics for the units above as well as the chapters in the Kreyszig textbook that we'll be covering.

Note that this is a graduate level course and so there is no requirement for a final examination. However, an important part of graduate level studies is individual research. Each student will complete a research paper on a topic relevant to engineering mathematics. More details along with a list of potential topics will be distributed in mid October.

Course Topical Outline

Unit Number	Unit Name	Text Chapter(s)
1	Linear Algebra	7, 8
2	Ordinary Differential Equations : Analytical and Numerical Methods	1, 2, 21
3	Special Functions	5+notes
4	Partial Differential Equations : Analytical and Numerical Methods	12, 21
5	Transform Methods : Laplace, z, and Fourier	6, 11, Notes
6	Vectors and Vector Calculus	9, 10
7	Probability Theory/ Elements of Descriptive Statistics	24, 25

Additional References

1. G. Arfken and H. Weber, Mathematical Methods for Physicists, Academic Press, 4th Edition.

2. C. Balanis, Advanced Engineering Electromagnetics, J. Wiley and Sons, 1st Edition.

3. R. Burden, and J. Faires, Numerical Analysis (various editions)

4. P .deRusso, R. Roy, and C. Close, State Variables for Engineers, J. Wiley, 1st Edition.

5. D. Fraser, Statistics : An Introduction, J. Wiley and Sons, 1st edition.

6. M. Greenberg, Advanced Engineering Mathematics, Prentice-Hall, 2nd Edition

7. E. Kamen, Introduction to Signals and Systems, MacMillian, 1987.

8. J. Mathews and R. Walker, Mathematical Methods of Physics, Addison-Wesley, 2nd Ed.

9. D. Zill and W. Wright, Advanced Engineering Mathematics, Jones and Bartlett, 5th Edition.