

ENGR 3300

Advanced Engineering Mathematics

Course Syllabus

Course Information

Course Number/Section ENGR 3300.501
Course Title Advanced Engineering Mathematics
Credits 3

Term Fall 2017
Days and Times MO & WE 5:30-6:45 pm
Location FO 2.404

Professor Contact Information

Professor Massimo Fischetti
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Office Hours By appointment

Teaching assistant (TA) Mehrdad Heydarzadeh (<mailto:mehhey@utdallas.edu>)

Course Pre-requisites, Co-requisites, and/or Other Restrictions

Prerequisite: MATH 2415 or MATH 2419 (or equivalent mathematics courses) and ENGR 2300.
Pre/Co-requisite: MATH 2420

Course Description

Survey of advanced mathematics topics needed in the study of engineering. Topics include a review of complex numbers, multivariate calculus, analytic geometry, and partial differential equations. Study of polar, cylindrical, and spherical coordinates, vector differential calculus, vector integral calculus, and vector integral theorems. Examples are provided from electromagnetic, fluid mechanics, physics and geometry.

Student Learning Objectives/Outcomes

- Solve problems in multivariable calculus;
 - Compute surface integrals and line integrals;
 - Understand gradient, divergence and curl;
 - Use Green's, divergence, and Stokes' Theorem
 - Understand the basic properties of partial differential equations
 - Work with complex numbers and variables
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Required Textbooks and Materials

Erwin Kreyszig, *Advanced Engineering Mathematics*, 10th Ed., Wiley, ISBN: 978-0-470-45836-5 (2006)

Suggested Course Materials

Posted on the class website http://www.utdallas.edu/~mvf100020/ENGR3300_F17.html

Supplemental Instruction:

Support for Computer Aided Software, CAS. Labs for this course is available. For information about the days, times and locations for SI sessions refer to: www.utdallas.edu/studentsuccess/leaders/si.html

SI leader: Joseph Hackenbracht (jwh140430@utdallas.edu)

Homework assignments and additional material will be posted on the class website:

http://www.utdallas.edu/~mvf100020/ENGR3300_F17.html

Topics from Advanced Engineering Mathematics-Kreyszig		
LECTURE	COURSE LECTURES COVER CHAPTERS 9 THRU 18	CAS/SI LABS
	CHAPTER 9 Vector Differential Calculus. Grad, Divergence, Curl	
1	9.1 Vectors in 2-Space and 3-Space	Calculus Review (see section 10.3)
	9.2 Inner Product (Dot Product)	
	9.3 Vector Product (Cross Product)	
2	9.4 Vector and Scalar Functions and Their Fields. Vector Calculus: Derivatives	Introduction to Mathematica
	9.5 Curves. Arc Length. Curvature. Torsion	
	9.6 Calculus Review: Functions of Several Variables. <i>Optional</i>	
	9.7 Gradient of a Scalar Field. Directional Derivative	
3	9.8 Divergence of a Vector Field	Vector Differential Calculus Lab
	9.9 Curl of a Vector Field	
	CHAPTER 10 Vector Integral Calculus. Integral Theorems	
4	10.1 Line Integrals	Vector Integral Calculus Lab
	10.2 Path Independence of Line Integrals	
	10.3 Calculus Review: Double Integrals <i>Optional</i>	
	10.4 Green's Theorem in the Plane	
	10.5 Surfaces for Surface Integrals	
5	10.7 Triple Integrals. Divergence Theorem of Gauss	Computer Aided Software Lab
	10.8 Further Applications of the Divergence Theorem	
	10.9 Stokes's Theorem	
6	Review	
7	Exam 1	
	CHAPTER 11 Fourier Analysis	
8	11.1 Fourier Series	Fourier Analysis Lab
9	11.2 Arbitrary Period. Even and Odd Functions. Half-Range Expansions	
	11.3 Forced Oscillations	
	11.6 Orthogonal Series: generalized Fourier Series	
	11.7 Fourier Integral 510	
	11.8 Fourier Cosine and Sine Transforms 518	
	CHAPTER 12 Partial Differential Equations (PDEs)	
10	12.1 Basic Concepts of PDEs	
	12.2 Modeling: Vibrating String, Wave Equation 543	Partial Differential Equation lab
	12.3 Solution by Separating Variables. Use of Fourier Series 545	
	12.4 D'Alembert's Solution of the Wave Equation. Characteristics	

	12.5 Modeling: Heat Flow from a Body in Space. Heat Equation	
	12.6 Heat Equation: Solution by Fourier Series	
	12.7 Heat Equation: Modeling Very Long Bars	
11	Review	
12	Exam 2	
	CHAPTER 13 Complex Numbers and Functions-Complex Differentiation	
13	13.1 Complex Numbers and Their Geometric Representation	Complex Number/Function Lab
	13.2 Polar Form of Complex Numbers. Powers and Roots	
14	13.3 Derivative. Analytic Function	
	13.4 Cauchy–Riemann Equations. Laplace’s Equation	
15	13.5 Exponential Function	Computer Aided Software Lab
	13.6 Trigonometric and Hyperbolic Functions. Euler’s Formula	
16	13.7 Logarithm. General Power. Principal Value	

	CHAPTER 14 Complex Integration	
17	14.1 Line Integral in the Complex Plane	
18	14.2 Cauchy’s Integral Theorem	Computer Aided Software Lab
19	14.3 Cauchy’s Integral Formula	
	14.4 Derivatives of Analytic Functions	
	CHAPTER 15 Power Series, Taylor Series	
20	15.1 Sequences, Series, Convergence Tests	Computer Aided Software Lab
	15.2 Power Series	
	15.3 Functions Given by Power Series	
21	15.4 Taylor and Maclaurin Series	
	CHAPTER 16 Laurent Series. Residue Integration	
22	16.1 Laurent Series	
	16.2 Singularities and Zeros. Infinity	
23	16.3 Residue Integration Method	Residue Integration lab
24	16.4 Residue Integration of Real Integrals	
25	Dr. Frensley’s Special PDE Topic	
27	Review	
28	Final Exam	

Grading Policy

10% Quizzes (if given), class attendance, and in-class cooperation
20% Homework Assignments (approximately every two weeks)
20% Exam 1
20% Exam 2
30% Final Exam

Course & Instructor Policies

<i>Make-up exams</i>	Only under extreme circumstances at the Professor's discretion
<i>Extra credit</i>	Not available
<i>Late work</i>	Not accepted
<i>Class attendance</i>	Not required unless specified in the calendar. However, attendance is STRONGLY encouraged

Sharing Confidential Information

Students considering sharing personal information in email, in person, or within assignments or exams should be aware that faculty members and teaching/research assistants are required by UT Dallas policy to report information about sexual misconduct to the UT Dallas Title IX Coordinator. Per university policy, faculty have been informed that they must identify the student to the UT Dallas Title IX Coordinator. Students who wish to have confidential discussions of incidents related to sexual harassment or sexual misconduct should contact the Student Counseling Center (972-883-2527 or after hours 972-UTD-TALK or 972-883-8255), the Women's Center (972-883-8255), a health care provider in the Student Health Center (972-883-2747), the clergyperson (or other legally recognized religious advisor) of their choice, or an off-campus resource (i.e., rape crisis center, doctor, psychologist). Students who are sexually assaulted, harassed, or victims of sexual misconduct, domestic violence, or stalking, are encouraged to directly report these incidents to the UT Dallas Police Department at 972-883-2222 or to the Title IX Coordinator at 972-883-2218. Additional information and resources may be found at <http://www.utdallas.edu/oiec/title-ix/resources>.

Campus Carry

The University's concealed handgun policy is posted on the campus carry website: <https://www.utdallas.edu/campuscarry/>

Technical Support

If you experience any issues with your UT Dallas account, contact the UT Dallas Office of Information Technology Help Desk: assist@utdallas.edu or call 972-883-2911.

UT Dallas provides eLearning technical support 24 hours a day/7 days a week. The services include a toll free telephone number for immediate assistance (1-866-588-3192), email request service, and an online chat service. Please use this link to access the UTD eLearning Helpdesk: <http://www.utdallas.edu/elearning/eLearningHelpdesk.html>.

Field Trip Policies, Off-Campus Instruction and Course Activities

Off-campus, out-of-state, foreign instruction/travel, and course-related field trip activities are subject to state law and University policies and procedures regarding travel and risk-related activities.

Detailed information regarding this policy, in accordance to *Texas Education Code*, Section 51.950, can be accessed at the UT Dallas Policy Navigator, <http://policy.utdallas.edu/utdbp3023>, and at <http://www.utdallas.edu/administration/insurance/travel>. Additional information is available from the office of the school dean.

Student Conduct and Discipline

The University of Texas System (Regents' Rule 50101) and The University of Texas at Dallas have rules and regulations for the orderly and efficient conduct of their business. It is the responsibility of each student and each student organization to be knowledgeable about the rules and regulations which govern student conduct and activities. General information on student conduct and discipline is contained in the UT Dallas online catalogs (<http://catalog.utdallas.edu>).

The University of Texas at Dallas administers student discipline within the procedures of recognized and established due process. Procedures are defined and described in the Student Code of Conduct, UTDSP5003 (<http://policy.utdallas.edu/utdsp5003>). Copies of these rules and regulations are available to students in the Office of Community Standards and Conduct, where staff members are available to assist students in interpreting the rules and regulations (SSB 4.400, 972-883-6391) and online at <https://www.utdallas.edu/conduct/>.

A student at the University neither loses their rights nor escapes the responsibilities of citizenship. He or she is expected to obey federal, state, and local laws as well as the Regents' Rules, university regulations, and administrative rules. Students are subject to discipline for violating its standards of conduct whether such conduct takes place on or off campus, or whether civil or criminal penalties are also imposed for such conduct.

Academic Integrity

The faculty expects from its students a high level of responsibility and academic honesty. Because the value of an academic degree depends upon the absolute integrity of the work done by the student for that degree, it is imperative that a student demonstrates a high standard of individual honor in his or her scholastic work.

Academic Dishonesty: Academic dishonesty can occur in relation to any type of work submitted for academic credit or as a requirement for a class. It can include individual work or a group project. Academic dishonesty includes plagiarism, cheating, fabrication, and collaboration/collusion. In order to avoid academic dishonesty, it is important for students to fully understand the expectations of their professors. This is best accomplished through asking clarifying questions if an individual does not completely understand the requirements of an assignment.

Additional information related to academic dishonesty and tips on how to avoid dishonesty may be found here: <https://www.utdallas.edu/conduct/dishonesty/>.

Copyright Notice

It is the policy of the University of Texas at Dallas to adhere to the requirements of the United States Copyright Law of 1976, as amended, (*Title 17, United States Code*), including ensuring that the restrictions that apply to the reproduction of software are adhered to and that the bounds of copying permissible under the fair use doctrine are not exceeded. Copying, displaying, reproducing, or distributing copyrighted material may infringe upon the copyright owner's rights. Unauthorized distribution of copyrighted material, including unauthorized peer-to-peer file sharing, may subject students to appropriate disciplinary action as well as civil and criminal penalties. Usage of such material is only appropriate when that usage constitutes "fair use" under the Copyright Act. For more information about the fair use exemption, see <http://copyright.lib.utexas.edu/copypol2.html>. As a UT Dallas student, you are required to follow UT Dallas' copyright policy (UTDPP1043 at <http://policy.utdallas.edu/utdpp1043>) and the UT System's policy, UTS107 at <http://www.utsystem.edu/board-of-regents/policy-library/policies/uts107-use-copyrighted-materials>.

Email Use

The University of Texas at Dallas recognizes the value and efficiency of communication between faculty/staff and students through electronic mail. At the same time, email raises some issues concerning security and the identity of each individual in an email exchange. All official student email correspondence will be sent only to a student's UT Dallas email address and UT Dallas will only consider email requests originating from an official UT Dallas student email account. This allows the University to maintain a high degree of confidence in the identity of each individual's corresponding via email and the security of the transmitted information. The University of Texas at Dallas furnishes each student with a free email account that is to be used in all communication with university personnel. The Office of Information Technology provides a method for students to have their UT Dallas mail forwarded to other email accounts. To activate a student UT Dallas computer account and forward email to another account, go to <http://netid.utdallas.edu>.

Class Attendance

Regular and punctual class attendance is expected. Students who fail to attend class regularly are inviting scholastic difficulty. Absences may lower a student's grade where class attendance and class participation are deemed essential by the instructor. In some courses, instructors may have special attendance requirements; these should be made known to students during the first week of classes.

Withdrawal from Class

The administration at UT Dallas has established deadlines for withdrawal from any course. These dates and times are published in the Comet Calendar (<http://www.utdallas.edu/calendar>) and in the Academic Calendar (<http://www.utdallas.edu/academiccalendar>). It is the student's responsibility to handle withdrawal requirements from any class. In other words, a professor or other instructor cannot drop or withdraw any student unless there is an administrative drop such as the following:

- Have not met the prerequisites for a specific course
- Have not satisfied the academic probationary requirements resulting in suspension

- Office of Community Standards and Conduct request
- Have not made appropriate tuition and fee payments
- Enrollment is in violation of academic policy
- Was not admitted for the term in which they registered

It is the student's responsibility to complete and submit the appropriate forms to the Registrar's Office and ensure that he or she will not receive a final grade of "F" in a course if he or she chooses not to attend the class after being enrolled.

Student Grievance Procedures

Procedures for student grievances are found in university policy UTDSP5005 (<http://policy.utdallas.edu/utdsp5005>). In attempting to resolve any student grievance regarding disputes over grades, application of degree plan, graduation/degree program requirements, and thesis/and dissertation committee, adviser actions and/or decisions, evaluations, and/or other fulfillments of academic responsibility, it is the obligation of the student first to make a serious effort to resolve the matter with the instructor, supervisor, administrator, or committee with whom the grievance originated.

Incomplete Grade Policy

As per university policy, incomplete grades may be given, at the discretion of the instructor of record for a course, when a student has completed at least 70% of the required course material but cannot complete all requirements by the end of the semester. An incomplete course grade (grade of 'I') must be completed within the time period specified by the instructor, not to exceed eight (8) weeks from the first day of the subsequent long semester. Upon completion of the required work, the symbol 'I' may be converted into a letter grade (A through F). If the grade of Incomplete is not removed by the end of the specified period, it will automatically be changed to F.

AccessAbility Services

It is the policy and practice of The University of Texas at Dallas to make reasonable accommodations for students with properly documented disabilities. However, written notification from the Office of Student AccessAbility (OSA) is required. If you are eligible to receive an accommodation and would like to request it for this course, please discuss it with your professor and allow one week advance notice. Students who have questions about receiving accommodations, or those who have, or think they may have, a disability (mobility, sensory, health, psychological, learning, etc.) are invited to contact OSA for a confidential discussion. OSA is located in the Student Services Building, SSB 3.200. They can be reached by phone at 972-883-2098, or by email at studentaccess@utdallas.edu.

Religious Holy Days

The University of Texas at Dallas will excuse a student from class or other required activities, including examinations and travel time for the observance of a religious holy day for a religion whose places of worship are exempt from property tax under Section 11.20, of the *Texas Tax Code*.

Students are encouraged to notify the instructor or activity sponsor as soon as possible regarding the absence, preferably in advance of the assignment.

Excused students will be allowed to take missed exams or complete assignments within a reasonable time after the absence: a period equal to the length of the absence, up to a maximum of one week. A student who notifies the instructor and completes any missed exam or assignment may not be penalized for the absence. A student who fails to complete the exam or assignment within the prescribed period may receive a failing grade for that exam or assignment.

If a student or an instructor disagrees about the nature of the absence [i.e., for the purpose of observing a religious holy day] or if there is similar disagreement about whether the student has been given a reasonable time to complete any missed assignments or examinations, either the student or the instructor may request a ruling from the President of UT Dallas or from the President's designee. The chief executive officer or designee must take into account the legislative intent of *Texas Education Code* 51.911(b), and the student and instructor will abide by the decision of the chief executive officer or designee.

These descriptions and timelines are subject to change at the discretion of the Professor.