

ASE 380P 2-ANALYTICAL METHODS II
EM386L MATHEMATICAL METHODS IN APPLIED MECHANICS II
CSE 386L MATHEMATICAL METHODS IN APPLIED ENGINEERING AND
SCIENCES

COE 372 APPLIED MATHEMATICS II

Spring 21, # 14170/ # 63025/ # 13975/ # 13795, TTHU 2:00pm - 3:30pm

Class Room: <https://utexas.zoom.us/j/94267434078>

Text: M. D. Greenberg, *Foundations of Applied Mathematics*, Prentice-Hall, Inc., Englewood Cliffs, New Jersey 1978.

Week	Topic	Chapter
1	Directional and partial derivatives. Differentials. Taylor's Theorem. Curvilinear systems of coordinates.	7
2	Grad, curl and div operators in curvilinear coordinates.	
	- Area, volume, line and surface integrals.	8
3	Gauss' and Stokes Theorems.	9
4	Elementary calculus of variations.	10
5	Elementary calculus of variations, cont. Lagrange multipliers.	10
<hr/>		
6	Self-adjoint operators. Review of Sturm-Liouville Theorem.	20
7	Separation of variables. Lots of examples.	26
8	Separation of variables and Fourier transform - cont.	26
9	Characteristics and classification of second order PDE's.	27
10	Green's functions. Perturbation techniques.	28
<hr/>		
11	Complex numbers, Euler's formula, functions of complex variable, complex differentiability, multi-valued functions, branch cuts.	11,12
12	Complex integral, Cauchy Integral Theorem, Taylor and Laurent expansions, radius of convergence.	13,14
	-	
13	The Residue Theorem and contour integration.	15
14	Evaluation of (inverse) Laplace and Fourier transforms.	
	Conformal maps.	15,16
15	Review and outlook at numerical methods.	29

Important: The above plan is tentative and subject to changes. We may cover the third part in a couple of weeks (less than presented above), and extend the first two parts (important modern subjects) which are more useful for research.

Homework: Homework assignments will be announced on Canvas. For group homework, each group of students will submit one single document of solutions of a pre-assigned homework. There will be a few problems each time, **only one or two of which will be chosen for grading.** Regular **coding problems** to understand theoretical concepts in depth will be optional

and provide bonus points. The information about which problem will be graded is not given out until **after** the submission of the homework. Note that coding problems will be always graded. **Only online submission, including codes, figures, etc, is allowed.**

TA: Jau-Uei Chen, email: chenju@utexas.edu. Zoom Office hours: **Mon and Wed 4:00pm-5:00pm**: <https://utexas.zoom.us/j/95239887197>

Exams: There will be 3 take-home exams, each of which will contribute 10% to the total score, and the rest of the percentage is from homework. Though each take-home exam would take 2-3 hours to solve, you will be given a few days to a week to take the exam (allowable duration may be different for different exams). **See the actual information for each exam under the Assignment Tab on Canvas.**

Final Grade: Is based upon the final score. The above table is **tentative** and may be curved.

Final score range	grade
90 - 100	A
85 - 89	A-
80 - 84	B+
75 - 79	B
70 - 74	B-
65 - 69	C+

Instructor: Dr. Tan Bui. Zoom Office hours: TTH, 1:00pm-1:45pm
<https://utexas.zoom.us/j/98854822161> Email: tanbui@oden.utexas.edu

Important: DO not send messages (questions or concerns) through canvas because we don't check email messages on Canvas. **All questions related to class must be posted through Piazza.** You should have received a Canvas announcement on Piazza. Here is the link to register for Piazza

piazza.com/utexas/spring2021/em386lase380p2cse386lcoe372

Every student is required to register for this Piazza class. Failing to register may miss important information/communications about the lecture notes, homework, Exam, Q/A, etc. **Students are strongly encouraged to answer questions from other students on Piazza.**

Important: It is **your responsibility** to read all Canvas announcements from Dr. Bui and TA Jau-Uei, where important messages are sent to you (every registered student will get the messages automatically). We are extremely busy, thus if we spend time writing something for you it must be important. And you will take all the responsibilities if you miss important things because you don't read the announcements/syllabus. **Questions whose answers are provided in Syllabus, Canvas Announcements, or Piazza Q/A will not be answered but be referred to these resources.**

Important: Assignments must be submitted on time, typically at Noon or Midnight, (no excuse unless having prior approval from Dr. Bui). 20% of the total grade will be subtracted for each day late (1 second after the deadline, every late day): Clarification will be made in the first

day of class. No excuse for submitting wrong files/solutions. You are responsible for checking the correctness of your solutions/files before submitting. Group homework will be regularly every one or two or three weeks depending on the pace of the class. Individual review assignment will be much less regular and will be peer-reviewed.

Important: Every Zoom lecture and office hours will be recorded and will be made available on Canvas. My handwritten lecture notes will be recorded in files and will be uploaded to Canvas after each class.

Attendance is required: It is the students' responsibility to attend all the lectures. Missing lecture without Dr Bui's prior approval may lead to missing knowledge for that lecture and the subsequent ones, which in turn may lead to failing the class. Only students missing classes with prior approval can see Dr. Bui for recapping the lecture and can ask questions about the missing lecture. If you miss class(es), without Dr. Bui's approval, you will be on your own studying the missing lectures.