M427L ADV CALCULUS FOR APPLICATIONS II, Fall 2018

Unique# 54050

Instructor: Dr. Yunyi Shen

Office: RLM 13.142

Office Hours: MW11:00-12:00, T10:30-11:30

Email: yshen@math.utexas.edu

Lectures: MWF 10:00A-11:00A RLP 0.130

Discussion Sessions: TTH 5:00P-6:00P RLP 0.130

Prerequisite: The prerequisite is 408D, 408L, 408S with a grade of at least C-.

Course description: Topics include matrices, elements of vector analysis and calculus functions of several variables, including gradient, divergence, and curl of a vector field, multiple integrals and chain rules, length and area, line and surface integrals, Greens theorem in the plane and space. If time permits, topics in complex analysis may be included. This course has three lectures and two problem sessions each week. It is anticipated that most students will be engineering majors. Five sessions a week for one semester.

Text: Marsden & Tromba, Vector Calculus 6th edition

Homework: Weekly homework will be assigned via ***Quest*** online due by 11:30p on Wednesdays.

This homework service will require a $30 charge per student for its use, which goes towards the maintenance and operation of the resource. If you are taking more than one course using Quest, you will not have to pay more than $60 per semester. Quest provides mandatory instructional material for this course. For payment questions, email: questfees@cns.utexas.edu.

Quizzes: A quiz will be given each Thursday in the discussion session. The material covered on the quiz will be based on the homework due on Wednesday.

Exams: There will be two mid-term exams taken in the discussion sections on: *October 4 and November 8*.

The final exam will take place on: *Monday, December 17, 9:00 am-12:00 pm.*

MWF 10:00 am–11:00 am	Monday, December 17, 9:00 am-12:00 pm

All exams are closed-book. No calculators are allowed. Two mid-terms are NOT cumulative but the final is cumulative.

Grade: Numerical course grades will be determined according to the formula H*12%+Q*8%+ M1*25% + M2*25% + F*30% where H=Homework Average, Q=Quiz Average, M1,2=Mid-Terms, F=Final. Letter grades will be determined from numerical grades as follows:
A-: 89-92.99; A:93-100
B-: 79-82.99; B:83-85.99; B+: 86-88.99;
C-: 69-72.99; C:73-75.99; C+: 76-78.99;
D: 59-68.99;
F: 0-58.99

Exam Policy: No makeup tests or quizzes will normally be given. If a test absence is excused under extreme situations, then the score on the final may, at the instructor's discretion, be substituted for the missing test grade. Students must bring UT ID card to all tests.

Students with disabilities: The University of Texas provides appropriate academic accommodations for qualified students with disabilities. For more information, contact the Office of the Dean of Students at 471-6259, 471-6441 TTY. If you plan on using such accommodations, you need to notify me early in the semester.

Religious Holidays: by UT Austin policy, you must notify me of your absence at least 14 days prior to the observance of a religious holiday. If you must miss a class, examination, or assignment in order to observe a religious holiday, you will be given an opportunity to complete the missed work within a reasonable time after the absence.

Resources for students: The Sanger Learning and Career Center in Jester A115 has many resources available --taped lectures, sample exams, drills, counseling, test anxiety support, tutors, a Math/Science Lab, and review sessions. The Center may be accessed on the web at http://www.utexas.edu/ugs/slc If you can't make the sessions offered, they often have the handouts available on the web.

Planned Course Pace:

- I THE GEOMETRY OF EUCLIDEAN SPACE (6 days)
  - 1.1 Vectors in two- and three-dimensional space
  - 1.2 The inner product, length, and distance
  - 1.3 Matrices, determinants, and the cross product
  - 1.4 Cylindrical and spherical coordinates
  - 1.5 n-dimensional Euclidean space
- 2 DIFFERENTIATION (5-6 days)
  - 2.1 The geometry of real-valued functions
  - 2.2 Limits and continuity
  - 2.3 Differentiation

- 2.4 Introduction to paths
- 2.5 Properties of the derivative
- 2.6 Gradients and directional derivatives

- 3 HIGHER-ORDER DERIVATIVES (3 days)
  - 3.1 Iterated partial derivatives
  - 3.2 Taylor's theorem
  - 3.3 Extrema of real-valued functions
  - 3.4 Constrained extrema and Lagrange multipliers
  - 3.5 The implicit function theorem (if time permits)
- 4 VECTOR-VALUED FUNCTIONS (5 days)
  - 4.1 Acceleration and Newton's Second Law
  - 4.2 Arc length
  - 4.3 Vector fields
  - 4.4 Divergence and curl
- 5 DOUBLE AND TRIPLE INTEGRALS (3 days)
  - 5.1 Introduction
  - 5.2 The double integral over a rectangle
  - 5.3 The double integral over more general regions
  - 5.4 Changing the order of integration
  - 5.6 The triple integral
- 6 THE CHANGE OF VARIABLES FORMULA (3 days)
  - 6.1 The geometry of maps (not crucial)
  - 6.2 The change of variables theorem (lightly)
  - 6.3 Applications of double, triple integrals (if time permits)
- 7 INTEGRALS OVER PATHS AND SURFACES (7 days)
  - 7.1 The path integral
  - 7.2 Line integrals
  - 7.3 Parametrized surfaces
  - 7.4 Area of a surface
  - 7.5 Integrals of scalar functions over surfaces
  - 7.6 Surface integrals of vector functions
- 8 THEOREMS OF VECTOR ANALYSIS (5-6 days)
  - 8.1 Green's theorem
  - 8.2 Stokes' theorem
  - 8.3 Conservative fields
  - 8.4 Gauss' theorem