

CAAM 402/502: Analysis II (Spring 2013)

Time and Location: T Th: 10:50am -12:05 pm, location DCH 1046.

Website: <http://www.caam.rice.edu/~caam402>

Instructor: Liliana Borcea

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Office Hours: M: 10:00-12:00 or by appointment.

Textbooks: Serge Lang “Undergraduate Analysis” and Michael Spivak “Calculus on manifolds”.

Course Description: CAAM402/502 is the second part of an introduction to mathematical analysis. CAAM 402 welcomes CAAM majors and other undergraduate students, and graduate students from other departments. CAAM 502 is intended to assist the CAAM graduate students in preparing for the qualifying exam. It involves additional homework.

Course Objectives: This course introduces mathematical concepts that are fundamental to further studies in both pure and applied mathematics.

Course Outcomes: Upon completion of this course the students should be able to:

- 1) Construct a mathematical proof.
- 2) Understand differential calculus in vector spaces.
- 3) Understand multiple integration.

Grade: Homework assignments will be given weekly. They will be generally due in one week. Two assignments will be pledged and together will count as 0.4 of the grade (0.2 each). The other homework assignments will count for 0.6 of the grade. There are no exams.

- **Homeworks and solutions will be posted on the course website. Hard copies will not be handed out.**
- All homeworks must be completed in order to pass this course.
- Homeworks are due in class, on the due date. Late homework will be penalized by 25% of the grade unless you have the instructor’s permission for a late submission. This permission must be granted before the homework is due.
- For the pledged assignments, the students can use the textbook. No other printed or electronic resources are allowed. Also no collaboration or assistance from others is allowed.
- **You are not allowed to use the Problems and Solutions Book for any of the homeworks.**

Any student with a documented disability needing academic adjustments or accommodations is requested to speak with me during the first two weeks of class. All discussions will remain confidential. Students with disabilities will need to also contact Disability Support Services in the Ley Student Center.

Topics listed in order:

- Differential calculus in vector spaces
 - Differentiability of real valued functions defined on R^n . (Lang, Chapter XV).
 - Derivatives in vector spaces. (Lang, Chapter XVII).
 - Contraction mappings. Fixed point theorem (shrinking lemma). (Lang, Chapter XVIII, Section 1.)
 - ODE's (Lang, Chapter XIX).
 - Implicit and inverse function theorems. (Lang, Chapter XVIII, Sections 2-4.)

- Integration
 - Multiple integration (Lang, Chapter XX and Spivak Chapter 3.)
 - Differential forms and Stokes Theorem. (Lang Chapter XXI and Spivak Chapter 5).