Syllabus

Instructor: Xiuyuan Cheng Email: xiuyuan.cheng@duke.edu
Time: Tu Th 10.15-11.30am
Classroom: Physics 227

Synopsis:

This course will cover basic theories of differentiation and integral in R^n and some general ideas in analysis. We will begin with differential mappings in more than one dimensions, the matrix representation of partial derivatives (the Jacobian), reviewing properties of linear transforms from linear algebra. We then discuss inverse and implicit function theorems as well as their geometrical interpretation, multivariate integration, and the change of variables formula. After that, we go to the topic of special functions including orthogonal polynomials and Fourier Series. Time permitting, we will briefly introduce functional space: the topology of the space, the norm of functions, and the different modes of convergence. The course will be a continuation of Math 531: Basic Analysis I.

Textbook:

[MH] "Elementary classical analysis" 2nd Edition, by Marsden and Hoffman. (Chapter 6-10)

References:

[R] "Principles of Mathematical Analysis" 3rd Edition, by Rudin. (Chapter 8-11)
[B] "Analysis: an introduction", by Richard Beals, Cambridge.

Prerequisite:

Mathematics 221; Mathematics 531 or equivalent (Note: If you have taken 431 instead of 531, make sure you are equally prepared by checking out the course scope of 531, e.g., by going over materials in Chapter 1-7 of [R] and Chapter 1-5 of [MH].) The course assumes that the students already have a good understanding of linear algebra, calculus (univariate and multivariate), and are comfortable with working on proofs.

Grading Policy:

Evaluation will be based on (i) homework assignment (20%) (ii) quizzes (10%), (iii) midterm (30%) and (iv) final exam (40%). Lecture notes will be distributed as the class goes. Homework will be assigned weekly. All exams and quizzes will be in-class. Discussion and collaboration on problem sets are encouraged, but all hand-in solutions, including homework, quizzes and exams, must be independent work. Late hand-in will not be counted towards grades except for special excuses (following the academic rules of the school). If a reschedule of an exam is needed, please contact the instructor as early as possible.