General course information:

- lecture: Monday, Wednesday, Friday 11:30 am - 12:20 am, Mundelein Center 205
- discussion: TBA
- webpage: www.math.luc.edu/~rgoebel1/Fall13Math351
- final exam: Monday, December 9th, 1:00 pm - 3:00 pm

Instructor information:

- name: Rafal Goebel
- contact: email rgoebel1@luc.edu (preferred) or office phone 773 508 7541
- office: Institute of Environmental Sustainability (IES) 601
- office hours: check the course webpage

Course outline: A rough and not complete description of Real Analysis would say that it is calculus with proofs. A better description would say that Real Analysis is interested not only in answers to calculus problems but also in if and why the answers exist in the first place. A more formal description would say that Real Analysis begins with the theory behind real numbers and the Euclidean space, studies sequences and their convergence, and applies these concepts to the analysis of functions, of continuity and differentiability of functions, and to integration of functions.

Real Analysis, especially the theory behind convergence, continuity, and approximation forms a foundation upon which many branches of mathematics are built, for example numerical analysis, optimization, and dynamical systems and control. It is also essential in rigorous approaches to economics, finance, theoretical physics, etc.

This course will be an introduction to Real Analysis focusing on real numbers, sequences and series of real numbers, their convergence, and on functions of one variable, especially their continuity and differentiability. Students will be expected to solve problems and, even more importantly, to read, understand, and formulate mathematical arguments and proofs.

We will cover large parts of the following chapters of the textbook: Chapter 1, Real Numbers and Monotone Sequences; Chapter 2, Estimations and Approximations; Chapter 3, The Limit of a Sequence; Chapter 4, The Error Term; Chapter 5, Limit Theorems for Sequences; Chapter 6, The Completeness Property; Chapter 7, Infinite Series; Chapter 8, Power Series; Chapter 9, Functions of one Variable; Chapter 10, Local and Global Behavior; Chapter 11, Continuity and Limits of Functions; Chapter 12, The Intermediate Value Theorem; Chapter 13, Continuous Functions on Compact Intervals; Chapter 14, Differentiation: Local Properties; Chapter 15, Differentiation: Global Properties.
Grading scheme: The course grade will be based on homework, midterms, and the final exam. The grade of A is guaranteed for 95 percent. The grade of C- is guaranteed for 70 percent. Homework counts for 25 percent, midterms (3 of them) count for 45 percent (15 percent each), final exam 30 percent.

Homework: Homework assignments will be given almost every week, and will be due on Fridays, at the beginning of the lecture. A detailed schedule will be available on the class webpage. There will be about 10 homework assignments. Two worst homework scores will be dropped, i.e., only the best 8 homework scores will count. Several, but not all of the problems that you turn in will be graded in detail. Credit will be also given for completeness of the assignment.

Collaboration on homework is allowed, and in fact strongly encouraged. Talk about homework to your classmates, work on the problems together, form study groups. However, write up the final solution on your own, only hand in your own work, and be sure that you can solve the problems yourself.

Midterms: There will be 3 midterm exams, on Friday, September 20th; Wednesday, October 23rd; and Wednesday, November 20th. Each midterm will be 49 minutes long. Each midterm will cover the material from about the 9 lectures preceding the exam. Problems on the midterms will be similar to the homework problems and to sample midterm problems which will be provided. A letter-sized one-sided sheet of handwritten (by you) notes is allowed. Collaboration is not allowed.

Final: There will be 1 final exam, on Monday, December 9th, 1:00 pm - 3:00 pm. It will cover all of the course material. Problems on the final will be similar to the sample final problems solved in the review lectures before the final exam. Final is closed-book, but one letter-sized, double-sided sheet of handwritten (by you) notes is allowed. Collaboration is not allowed.

Missing exams: Usually, only religious holidays, official Loyola athletic activities, and well-documented emergencies are basis for a make-up midterm or late turn-in of homework. In general, the sooner you notify the instructor about a conflict with an exam, the better. Missing an exam without prior notification and without a well-documented emergency or other extenuating circumstances will result in a score of 0.

Academic integrity: All work performed during quizzes and final exam must be your own work. Cheating may result in a grade of "F" and notification of the appropriate dean. Cheating during exams includes, but is not limited to: copying another person's work, allowing another person to copy your work, collaborating with another person, using unauthorized references, etc. Remember though: collaboration on homework assignments is OK, and in fact is encouraged.