UNIVERSITY OF NEBRASKA AT OMAHA

MATH 4230/8236 Mathematical Analysis I

TR 4:00 PM – 5:15 PM | Valentin Matache

Analysis is a word invented by scholars. In Greek **ana** means after whereas **lisa** means cut or break. Thus the analytic method is the method of "mincing" the whole into its components and study them in order to understand the system. The computational part of entry-level mathematical analysis is designated by the name **Calculus** and has 3 parts: Calculus I or Differential Calculus, Calculus II or Integral Calculus, and Calculus III or Multi-variable Calculus.

Calculus is a standard component in almost all STEM programs in the world. The word calculus means "pebble" and so calculating was "pebbling" to the ancient mathematicians. Nevertheless. modern analysis, even in its computational form, is rather recent. Supported by the shoulders of huge mathematicians like Vi`ete, Fermat, Newton, John Bernoulli and others, the marguis of L'Hopital, published the very first calculus textbook. It contained mainly what we call now Calculus I, but it was not titled calculus, but ANALYSIS, more precisely: "The analysis of the infinitely small, with applications to the study of curves" (translated from the French original), so ANALYSIS not CALCULUS. It happened a little earlier than 1700 and the book contained no integrating theory.

Introductory Mathematical Analysis is technically speaking "The Theory of Calculus", that is: concepts understood with care, theoretical statements rigorously proved, analytic thinking developed. Some concepts and facts are those already familiar to students from the calculus courses. Others will be introduced. This time the emphasis will be on developing their analytic thinking rather than their ability of learning computational skills (like in the Calculus courses). This first course in theoretical analysis will cover the first half of Walter Rudin's bestseller: *Principles of Mathematical Analysis*. The second half will be covered next semester in the sequel: **MATH 4240/8246**, Mathematical Analysis II. The applications of analysis to life and science are huge. Isaac Newton, the main contributor to early calculus, got the immense credit he enjoys, for developing the theory of computational analysis (or calculus), in order to understand phenomena like motion and gravity, to give just one very basic example.



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