Mathematical Structuralism

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This seminar will be offered jointly by Carnegie-Mellon University (80-513/813) and the University of Pittsburgh (Philosophy/HPS).

Since the late 19th century, a wide range of mathematics (algebra, topology, geometry, number theory, representation theory, differential equations) has advanced strikingly by adopting a series of "structuralist" approaches: studying structured totalities of objects (groups, number fields, spaces), often axiomatically characterised, and their mappings and constructions (1930's modern algebra, Bourbaki, homotopy and (co-)homology groups in topology and generalizations, categories).

This research course will explore philosophical, mathematical, and historical issues related to structuralism in mathematics from about 1870-1960. The long-term philosophical goal of the project is to determine what kinds of systematic differences explain the intellectual power of structuralist conceptions in mathematics. Philosophers may also be interested in comparing to the so-called "structuralist" philosophy of mathematics.

The course is designed for philosophers and mathematicians. To accommodate those with limited mathematical training, we will attempt relatively unsophisticated mathematical explanations. The issues explored are not traditional in the philosophy of mathematics, and interested mathematicians without background in philosophy of mathematics will also find suitable challenges and research projects.

The initial text will be Richard Dedekind 1877, *Theory of Algebraic Integers*, English transl., J. Stillwell, CUP 1996. It is hoped that students will start familiarizing themselves with both the translator's Introduction before the first class meeting. The text will be available at the Carnegie Mellon Bookstore, but can also be purchased from a number of online booksellers; the list price is $26.

The course can be taken for either undergraduate or graduate credit, in which case a final grade will be determined based on participation and a final paper. Auditors and visitors are more than welcome.

The permanent meeting time has not yet been determined. The first, organizational, meeting will be at 1:00 on Monday, August, 26, in room 1001B of the Cathedral of Learning. We will use that opportunity to determine the backgrounds of the various participants, and to choose a meeting time that will accomodate as many people as possible. If you may be interested in participating (and, especially, if you cannot attend the first meeting), please notify either organizer by e-mail (avigad@cmu.edu, mandersk+@pitt.edu).

This description is mirrored on the seminar web site,

`http://www.andrew.cmu.edu/~avigad/Seminar`