

MATH 381W SPRING 2013
SEMINAR IN CLASSICAL AND MODERN ANALYSIS

T. ARCHIBALD

WHAT IS A SEMINAR COURSE?

The calendar description says that this is to be “a writing and presentation intensive study of an area of mathematics” in which students will read and prepare written and oral comments on material in the mathematics literature. The emphasis passes from the professor doing all the talking to students doing more of the work, preparing as a group for a specified topic.

HOW DOES THE COURSE WORK?

In this course, we will look at a combination of original source materials (as in, things written by famous mathematicians when they were inventing things), expository presentations (including but not limited to textbooks), and (a little) recent literature. As for the content, the course will try to complement and unify the analysis offerings in our undergraduate stream by looking at a set of topics that ordinarily are not offered in one course. I will introduce each topic, with the members of the class then taking turns presenting material orally and writing up aspects of their findings. Individual student interests can be taken into account to some extent. See the list of prospective topics below.

WHAT WILL I GET OUT OF THIS COURSE?

The aim is to learn how to deal with varying kinds of mathematical literature at a level which allows you to present more advanced mathematics to others, both orally and in writing. A secondary aim is to introduce you to finding things in the literature of mathematics.

WHAT KIND OF TOPICS WILL BE COVERED?

Topics may include things such as:

- Fourier analysis and its generalizations
- The hypergeometric series and the hypergeometric equation.
- Elliptic functions from the analyst’s viewpoint.

- Why does Existence Theory exist?
- Potentials from physics to pure mathematics
- The Dirichlet Principle and the Calculus of Variations
- From Integral Equations to Linear Operators on Banach Space
- Differential forms and Stokes' theorem

HOW IS IT EVALUATED? IS IT HARD?

Evaluation is based on your oral and written presentations and on your participation in the discussion and the course wiki. While one or two people will be responsible for presenting on each of the topics selected, everyone will have some reading to do to prepare for class. We will hope for some lively discussions. In particular, it is hoped that the course will provide a brief introduction to a lot of interesting and useful topics, and try to sew together the vast domain of analysis in a way that will help you in future study, teaching, or applications. Some of the participation will also likely be in the form of investigating problems related to the topics.

As with all mathematical material, the course can challenge the student. You will be trying to work more independently than in some courses. I will run office hours to assist those attempting to prepare for their presentations. Seminars are intended as an introduction to working methods in research. It will likely feel harder than some of the courses that are structured more on week-to-week problem sets.

WHAT ABOUT PREREQUISITES?

Math 242 is advised, because of the topic, along with the nominal prereq of 6 h of 200-level mathematics. You will be expected to be able to distinguish between a rigorous argument and an expository account. If you have not taken Math 242 or Math 240 or both, we should talk.

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