MA197x Syllabus

Bridge to Higher Mathematics

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or by appointment
. . . or, just drop in

MA 197x – D01, D Term 2011
Bridge to Higher Math
Text: "Write Your Own Proofs: In Set Theory and Discrete Mathematics by A. Babich and L. Person
Meetings: 3:00–3:50 MTRF

Course web page: http://users.wpi.edu/∼martin/TEACHING/1970/

The goal of this course is to introduce the student to mathematical thinking. The defining characteristic of mathematics as a science is its reliance upon formal logical proof. Mathematics is not an experimental science where "laws" are the result of repeated observations. Every law in mathematics is either an axiom (a basic assumption) or something that has been rigorously derived. We will explore this concept of proof from first principles.

Our primary goal is to develop in each student a familiarity with the mechanics of basic mathematical proofs. Advanced proofs are characterized by their creativity, by the connections they draw between seemingly unrelated facts and concepts, and by their novel application of known theory. But before the student can ascend to these intriguing heights, s/he must first know what makes a correct proof and how to distinguish proper logical arguments from fallacious ones (or from just plain bullshit). The student must first learn the difference between a hypothesis and a conclusion, between a universal and an existential quantifier, between direct and indirect proofs, and so on. These mechanics of proof form the core objective of the course. But we also aim to develop our professional communication skills. So students will be expected to present material to one another, both at the whiteboard and in small group discussions. As time permits, we will also discuss current events and recent issues in the mathematical sciences.

A TYPICAL MEETING

We have 28 meetings together and I do not want to constrain us by prescribing where we will be in the main text on any given day or exactly how the class will be conducted.

All students are expected to arrive at class **fully prepared** to participate; any student can be called upon at any time to lead the class. Classroom attendance and participation is a mandatory part of your grade.

While I expect we will have quite a few lecture periods, my intention is to mix things up whenever possible. In a given class, we may do any of the following:

- discuss the text;
- have one or more of us present material from the text;
- solve problems in groups;
- discuss contemporary issues in mathematics.

GRADING SCHEME

Classroom Participation:	15 %
Homework (5–7 assignments):	40 %
Mathematics Activity Report:	5 %
Final Portfolio (best 40 problems):	20 %
Final Test (May 3):	20 %

There will be one test, on May 3, restricted to theorems that have already been proved in class or in homework.

GRADES

A: 100 % – 88 %; **B**: 87.99 % – 74 %; **C**: 73.99 % – 60 %

CLASSROOM PARTICIPATION

Mathematics is not a spectator sport. A student must be actively involved in the learning of mathematics and in the development of the course to truly benefit from it. Therefore all students are expected to participate.

In every class, all students will be graded on their participation in that class. This can take a number of forms, such as presenting at the blackboard, asking questions, answering questions, helping a classmate, participating in discussions, providing written solutions to problems. (Absences from particular class meetings – when properly justified – will be handled on an individual basis.)

HOMEWORK

Each student should maintain a portfolio of graded homework problems. Each problem will be graded on a scale of one to five, reflecting both correctness and clarity of the solution. Assignments will be collected roughly once per week throughout the term.

At the end of the course, the student shall submit his or her portfolio with forty problems that the student wants included in his or her final grade. These 40 problems may be problems previously submitted and returned with a grade or new problems, not on any assignment, that have been assigned by the instructor for extra credit. The portfolio is to be submitted on Monday, May 2.

ACTIVITIES

As we all know, mathematics is alive, even today. Even on the WPI campus, there are exciting mathematical activities open to the interested student, in any given academic year. For example, Math Hour is a weekly event where students interested in mathematics gather to discuss problems, ideas, puzzles and games.

Each student in the course is required to write a two-page report on one of the following:

- The **Harold J. Gay Lecture:** Dr. Louis Kauffman, University of Illinois at Chicago, will speak Friday, March 25th at 3:00pm, in OH107, on topological quantum information and the Jones polynomial. All students in MA197x are expected to attend.
- The **Spring 2011 Meeting** of the American Mathematical Society will be held on the Holy Cross campus Saturday-Sunday April 9–10, 2011. Each student is encouraged to attend least one of the 100+ talks to be given at the conference and to write a short report on the talk.
- Weekly research colloquia in the Department of Mathematical Sciences — any student who misses one of the above two assigned events may, with the instructor's permission, write a report on a selected colloquium talk. Colloquia are typically held at 11am on Fridays in SH203.
- Mathematics Awareness Month activities. Students are expected to take part in appropriate advertised activities. (I will give you more details later in the term.)

IMPORTANT NOTES

- Collaboration with classmates is *usually* strongly encouraged. But in the case of homework problems to be submitted for credit in this course, consultation with classmates should be limited to the solicitation of critiques only, and only after a reasonable first draft of your solution has been completed.

STUDENTS WITH DISABILITIES

If you need course adaptations or accommodations because of a disability, or if you have medical information to share with me, please make an appointment with me as soon as possible. My office location and hours are listed at the top of this syllabus. If you have not already done so, students with disabilities, who believe that they may need accommodations in this class, are encouraged to contact the Disability Services Office (DSO), as soon as possible to ensure that such accommodations are implemented in a timely fashion. The DSO is located in Daniels Hall, (508) 831-5235.

ACADEMIC INTEGRITY

Please read the Student Guide to Academic Integrity at WPI and all its pages. For example, the page What Constitutes Academic Dishonesty? – found here:
`http://www.wpi.edu/Pubs/Policies/Honesty/Students/constitutes.html`
– gives some examples of academic dishonesty; i.e. acts that interfere with the process of evaluation by misrepresenting the relation between the work being evaluated (or the resulting evaluation) and the student's actual state of knowledge.

Each student is responsible for familiarizing him- or herself with academic integrity issues and policies at WPI. All suspected cases of dishonesty will be fully investigated.