

# MA1971 Syllabus

*Bridge to Higher Mathematics*

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**Office hours:**

3:00-3:50 Mon/Tues, 10:00-10:50 Thur/Fri

or by appointment . . . or, just drop in

**Course web page:** <http://users.wpi.edu/~martin/TEACHING/1971/>

MA 1971 – D01, D Term 2016

Bridge to Higher Math

**Text:** “Write Your Own Proofs: In Set  
Theory and Discrete Mathematics”

by A. Babich and L. Person

**Meetings:** 2:00–2:50 MTRF

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 blackboard 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 assigned readings from 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):	50 %
Current Events Report (April 22):	5 %
Final Portfolio (April 29):	10 %
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 their 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 Friday, April 29.

## REPORT ON CURRENT EVENTS

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.

In order to increase awareness of current events, each student in the course is required to write a five-page report on some recent article in either *Mathematics Magazine* or the *American Mathematical Monthly*. These two publications of the Mathematical Association of America are available on-line for free through the WPI web portal.

The topic of your report must be approved by me and you are required to meet with me at least once in planning your report. Your report will contain at least one non-trivial proof and many (at least six) examples. Rough drafts are due Friday April 15th and final reports are due, in class, Friday April 22nd.

## 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

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 the Student Development and Counseling Center and the phone number is 508-831-4908, e-mail is DSO@wpi.edu.

Their website is at <http://www.wpi.edu/offices/disabilities.html>

If you are eligible for course adaptations or accommodations because of a disability (whether or not you choose to use these accommodations), or if you have medical information that I should know about please make an appointment with me asap. The more we communicate, the more we can develop productive conditions for you.

## ACADEMIC INTEGRITY

Please read the STUDENT GUIDE TO ACADEMIC INTEGRITY AT WPI and all its pages. For example, the page ACADEMIC HONESTY POLICY – found here:

<http://www.wpi.edu/offices/policies/honesty/policy.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. (The entire guide can be found here: <http://www.wpi.edu/offices/policies/honesty/studentguide.html>)

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.