# Math 281: Foundations of Mathematics (or "FOM" to you)
# Spring 2012

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| **Instructor:** | Prof. Susan Goldstine (rhymes with "line") |
| **How to address me:** | Susan, Prof. Goldstine, or any polite variation of my name |
| **E-mail:** | `sgoldstine@smcm.edu` (my preferred form of communication) |
| **Phone:** | x4366 |
| **Office:** | Schaefer 171 |
| **Office Hours:** | Monday, 4:30–5:30 PM; Wednesday, 12:00–1:00 PM;<br>Thursday, 1:30–2:30 PM; and by appointment.<br>Drop-ins are welcome, as long as I happen to be free. |
| **Text**: | Carol Schumacher, *Chapter Zero: Fundamental Notions of Abstract Mathematics* (2nd Edition) |
| **Section 1 TA**: | Jonathan Kwolek |
| **E-mail**: | `kwolek.jonathan@gmail.com` |
| **Review Session**: | Tuesdays, 6:00–7:00 PM in Schaefer 161 |
| **Section 2 TA**: | Hattie Schiavone |
| **E-mail**: | `hrschiavone@smcm.edu` |
| **Review Session**: | Thursdays, 6:00–7:00 PM in Schaefer 109 |

**All FOM students are welcome in both review sessions.**

**Course Material**

We will cover most of Chapters 1–5 and Chapter 7 of the textbook. In the process, we will explore the following topics.

- What it means to prove something, and why we prove things.
- Problem solving skills – systematic ways to get unstuck when you're stuck on a problem.
- Logic – the language underlying mathematics.
- Set theory – uses of sets and operations on sets.
- Induction – proving an infinite number of cases – all at once!
- Relations – a powerful tool for comparing mathematical objects.
- Functions – all the things you remember from calculus and much, much more.
- Cardinalities – how can we measure the infinite?

**Course Resources**

Naturally, you have written resources to help you with the course material, some preexisting (especially your textbook), and some that you will produce as the course progresses (your reading exercises and your homework, together with our feedback.) But the most important resources at your disposal are people.

First and foremost, you have each other. Do not underestimate the value of your classmates to help you get the most out of FOM. Professional mathematicians do not work in isolation, and neither should you. In particular, we encourage you to work on your assignments with others, though everything you write in your reading exercises or on your homework must be your own.

Secondly but no less importantly, there are Jonathan and Hattie and me. Please make use of our review sessions and office hours. We have set the time aside for you, and when you don't come and see us, it makes us sad.

**Assessment**

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| Reading Exercises | 15% |
| Class Work | 10% |
| Homework | 15% |
| Test 1 | 20% |
| Test 2 | 20% |
| Test 3 (Final Exam) | 20% |

**Reading Exercises**

*Chapter Zero* is designed to guide you interactively through the foundations of mathematics, and it will be your starting point for each new topic we cover. Each section of the text is sprinkled with exercises, problems (which is what Schumacher calls something more challenging or open ended than a garden variety exercise), and theorems with proofs that are left to you to fill in. For each reading, I will assign some of the exercises, problems, and/or proofs for you to write up in Google Docs, a platform that makes it easy for us to give you feedback on your work. I recommend that you think about all of the exercises even if they are not assigned, since they will help you master the mathematics.

This will be your first attempt at the material, and you may get stuck or make mistakes, which is part of the learning process. We will grade the reading exercises based on whether you made an earnest effort on each exercise and how clearly you explain your work. If you are stuck on an exercise or confused about the math, try to articulate where you are stuck and what you are thinking by telling us what you tried, where you looked in the reading for guidance, and/or why you are not sure of your answer.

It is very important for both your own learning and for the flow of in-class activities that you do not fall behind in the reading exercises.

**Class Work**

What we do in class will be informed by your reading exercises. Much of the time in class will be spent in discussion about the material from the previous readings, group exercises to explore the material further, and assessing your classmates' proofs and problem solutions. The class work grade is based on your active participation in these activities.

**Homework**

About once a week, instead of a reading assignment we will have a written homework assignment that covers the material from the earlier reading and class work. You will submit these assignments in writing (either hand written or typed and printed) in class, and we will grade them on accuracy and clarity.

Homework that is one class meeting late will have its grade reduced by 10%, homework that is two class meetings late will have its grade reduced by 30%, and no credit will be given for homework more than two class meetings late.

**Tests**

We will have three tests through the semester including the final exam. Each test will focus more on the material in the sections that have not been covered on previous tests, but the material in FOM is cumulative by nature, and so all the tests will be cumulative as well.