MATH 218-02, Spring 2016
Instructor: Dr. Rachel Schwell
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Office: Marcus White 321 Office Phone: 832-2844
Office Hours: M: 6:00-7:00; T: 2:00-3:00; Th: 12:50-2:30; F: 12:30-1:50; or by appt.

Course Description: Topics include logic, set theory, functions, elementary number theory, and a variety of proof methods including induction. As this course also serves as a bridge to upper-level proof-based math courses, it will be heavily focused on proof-writing.

Logic, reasoning, and proof are the cornerstones of mathematics. The material you will encounter in this class will feel quite different from what you are used to from calculus. This may throw you off at first, because you will be looking for numbers and won’t find any! But, one way to thus see this course is as a fresh start, if you struggled in calculus.

Class Times: The class will meet MW 1:40-3:20 pm in MS 321.

Text: None! Handouts/Notes only.

Moore Method: We will be using a modified Moore method this semester. The following is an overview:

“The Moore Method (or Texas Method) of mathematics instruction is a teaching/learning style propagated by Robert Lee [R.L.] Moore of The University of Texas at Austin in the first half of the 20th century. Moore is considered by many to be one of the greatest American mathematics teachers and was prolific in producing students who went on to earn the Ph.D. degree in mathematics and other fields. The method can be traced back to E.H. Moore, who was R.L. Moore’s advisor at the University of Chicago, but R.L. Moore was the one who made it famous. It is also related to the Socratic Method employed in American law schools, but without the confrontation inherent in that method.”

Traditional Moore Method:

- No textbook; students are provided with list of problems on first day
- Starting from second day, students present solutions on board
- Students are not allowed help in solving problems
- Audience is not allowed to contribute or make suggestions to presenter
- If presenter gets stuck during presentation, (s)he must fix the mistake in one minute or sit down

While this seems extreme, there are some good motives behind it, and it turns out that the Texas method has been very successful in the classroom and has been credited for the large number of Moore’s students who went on to get Ph.D.s. Everyone will tell you that they’ve learned the most throughout their lives by doing, and not simply watching. Imagine learning to play baseball by only ever watching the coach do it! Just as players take turn at bat, you will take turn “batting” at math. Part of learning is making mistakes, and fixing them. If you are perfect all the time, and never make a mistake, I venture that you are not really learning and certainly not challenging yourself.

Since this class will likely be very different from any mathematics class you have previously
taken, you may struggle with the material from time to time. This is completely natural, as very few worthwhile pursuits are ever easy. In fact, there can’t really be true reward without some struggle, and the greatest satisfaction comes from overcoming such struggle. Also, it’s important to realize that everyone struggles at some point in mathematics, even me. What’s most important is what you do in that situation, i.e. if you give up or if you rise to the occasion and embrace the process.

We will not be using the Moore Method in its strictest approach. Instead, we will be using what is known as a modified Moore Method, as follows:

I may occasionally lecture at the board to provide an introduction to a certain topic or clarify a particular problem or question. Approximately half the class time will be spent on student presentations of solutions at the board. The rest of the class time will be spent working on problems in groups of 3-4 people, which I will select. Note that there will not be enough class time for you to work on every problem together, so many of the problems you will need to work on outside of class, either alone or with classmates (either the assigned group or not). Any problem you turn in or present to the class should be written in your own words. When you present or turn in a problem, you will be asserting that you have not received any unauthorized help on the work and that you understand the argument you are presenting. You must not look to any source other than your classmates or me for solutions to problems: this includes books, magazines, the internet, completed solutions of your fellow students and notes from students who have taken this class in previous semesters. If you are unsure of the permissibility of a source, please ask me. Make sure that you are not parroting someone else’s solutions, because not only will it be obvious when you present, this will NOT prepare you for exams. And not to mention, you won’t really be learning!

**Audience:** As an audience member, you will be expected to follow along with your peers’ presentations, and it is certainly in your best interests to do so since if I deem a presentation to a particular problem to be a correct solution to that problem, we will not be revisiting it. Also, I expect you to be supportive of your classmates when they are at the board presenting. We are all in this together, and so attempting to boost your own standing by putting others down will not be met with success. However, questions and other constructive contributions are encouraged and included in your participation grade as noted below. Do not feel embarrassed to ask a question: chances are that if you have a particular question, then someone else in the class has a similar or even identical one. Note: questions that reveal the solution to the problem or imply a different approach are not permitted, and will not be met with approval. In other words, once a classmate has begun his or her presentation, we must follow along with the direction in which (s)he is going and not attempt to direct him or her toward alternative solutions. One last important thing to note: you will not be allowed to take notes during others’ presentations. This is for two reasons: one, so that you can focus on understanding the presentation rather than scribbling it down, and two, so that you can turn in problems post-presentation and they will be in your own words (see below under “Hand-in Homework”).

**Presentations:** When presenting, keep in mind that your audience is not simply me, your instructor. Your primary audience is your classmates, and so your presentations must be aimed toward your peers, to ensure that they understand and are convinced of any claims you are making. Presentations will be graded on the following 20-pt scale, with weighting of points following each component:
(1) Correctness of ideas (10)
(2) Clarity of presentation of ideas (5)
(3) Responses to audience’s questions (5)

Also taken into account will be your willingness to present; i.e., the more you present, the higher your presentation grade, and the less you present, the lower your presentation grade. I will provide a “receipt” with my comments from each of your presentations, of which I will also retain a copy for my own records. You are always free to come see me in office hours to discuss any comments I have made on the presentation and/or the grade you received. Note that I will not be grading you on typical public-speaking criteria (eye contact, projecting voice, etc.), although they will certainly help get your ideas across, and improvement of these skills is hopefully inevitable if not deliberate. However, note also that you ARE expected to speak during your presentation and explain aloud what you are doing. It is not simply a problem written on the board in silence, and it is not simply a word-by-word reading of what you have written. The verbal comments should complement what is written. However, what is written should also stand alone and should not require the verbal explanation in order to be a correct and complete solution. You should be proud of your solution, but keep in mind that your presentation is meant to be a learning experience/opportunity for the audience. So, you shouldn’t race through it in an attempt to show off. (The audience will still be impressed even if they understand what you did. 😊)

**Participation Grade:** Your class participation will be graded. The components of this grade are, in weighted order:

1. Oral presentations of problems – this includes the scores you received weighted by the frequency of presentation (50%)
2. Your feedback on other students’ presentations (30%)
3. Your participation in solving problems within your groups (20%)

Clearly, none of the above components can be fulfilled without regular attendance, and absences will adversely affect the class participation portion of the final grade.

**Hand-in Homework:** You must turn in at least 50 Problems (labeled as such in the notes) over the course of the semester, with a minimum of two new problems per week, and a maximum of six per week. If you do not turn in at least two new problems in a given week, you will receive zeros in place of those two for the week. You may redo a problem, but it will count as one of your six for that week but not as an extra toward your 50. It will also not count as one of your two minimum required per week. At the end of the semester, zeros will be entered for as many problems shy of 50 you are. You also may turn in more than 50 Problems if you wish to increase your average (and your understanding). They will not replace previous grades, but for every four problems over 50 you submit, a low problem grade will be dropped. You may hand in homework to be graded as soon as you have it done (barring the six-per-week limit). You will receive full credit for problems handed in before they have been presented, and 75% credit for those handed in after. A problem can be in handed no later than seven days after it has been presented, and no later than seven days after we have completed the chapter within which it is contained (i.e. the last problem from the chapter has been presented). Homework problems must be turned in as hard copies (can be slid under my office door), and may not be e-mailed. Thus, the “week” ends Friday afternoon when I leave campus at around 3:30.

I encourage you to take advantage of the ability to do rewrites, and to turn problems in early. Also, DO NOT WAIT to turn in only perfect problems. Though 50 seems easily attainable now,
that is only the case if you are consistently handing in problems. When you are writing up your homework problems, and you are not sure how much of an explanation to include, always remind yourself that you should think of your audience as *your classmates*. In other words, *if you were to hand your write-up to a classmate would (s)he understand it?* If not, more detail is needed.

**Exams:** There will be two exams throughout the semester; I will announce the date of the first one within the next few weeks. These will consist of questions spanning a range of difficulty, similar to the range seen on the homework problems. Some of these may contain new terms (defined in the problem), which will be testing your ability to interpret and apply definitions. Exams must be taken in pencil, with points taken off for using pen. **Exams may only be made up in advance, or afterwards only with the proper documentation justifying your absence.** The cumulative final exam will take place on Wednesday, May 11, 2:00 - 4:00 pm.

**Grading:** Your grade will be calculated by the following distribution:

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<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Participation</td>
<td>18%</td>
</tr>
<tr>
<td>Hand-in Homework</td>
<td>18%</td>
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<tr>
<td>2 Exams – 17% each</td>
<td>34%</td>
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<tr>
<td>Final Exam</td>
<td>30%</td>
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Letter Grades will still be assigned according to the following standard 100-point scale:

- **A:** 92.5 and above
- **A-:** 89.5-92.4
- **B+:** 86.5-89.4
- **B:** 82.5-86.4
- **B-:** 79.5-82.4
- **C:** 72.5-76.4
- **C-:** 69.5-72.4
- **D+:** 66.5-69.4
- **D:** 62.5-66.4
- **D-:** 59.4 and below

**Expectations:** I of course expect you to attend class and participate. I also expect that you will put in the standard expected amount of out-of-class time, which is two hours for every credit hour, or eight hours total per week for this course. Unlike other courses where you may not have needed that full eight hours, you should expect that for this course you will.

**What I expect you to gain from this experience:**

- Confidence
- Ability to learn independently, and take ownership of that learning
- Ability to work in groups
- Mastery of concepts
- Ability to problem-solve
- Improved presentation and communication skills

Strong critical thinking and the ability to problem-solve are what every employer seeks in an employee, and are invaluable life skills. Specifically, consider the following statistics taken from a study by Hart Research Associates entitled *Raising the Bar: Employers’ Views on College Learning in the Wake of the Economic Downturn* (2010). The following percentages represent the percentages of employers who want colleges to “place more emphasis” on the associated learning outcome (I have boldfaced those outcomes that this method specifically addresses):

<table>
<thead>
<tr>
<th>Learning Outcome</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Written and Oral Communication</td>
<td>89%</td>
</tr>
<tr>
<td>Critical and Analytical Thinking</td>
<td>81%</td>
</tr>
<tr>
<td>Applied Knowledge in Real Settings</td>
<td>79%</td>
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</table>
Complex Problem Solving  75%
Ethical Decision Making  75%
Teamwork  71%
Intercultural Competence  71%
Creativity and Innovation  70%
Information Literacy  68%
Quantitative Reasoning  63%
Civic Knowledge and Engagement  52%

A Few Final Notes:
1. Writing and rewriting are a key part of your learning and success in this class. I expect that your first attempts won’t be perfect and will need revision, but that by addressing the comments I give you, you will learn. Along these lines, expect your papers to be covered in comments, especially when you are learning a new topic! But it is because I care, and want you to learn, and know that you can.
2. With this in mind, think quality over quantity. Racing to get through 50 problems won’t serve your learning, or your grade, as well as taking the time to rewrite as many as you can will.
3. Even though you will not be turning in all the problems, you should do all of them, because you are certainly expected to know all the concepts and will be tested on them.
4. Do not expect to be able to read the notes, and math in general, like a novel. It may take you an hour to parse one sentence (the course notes in total are only about 60 pages long total – that is because every word matters).
5. As you will see from your peers’ letters, you will get out of this class what you put in!

University Policies:
1. You must take the final examination at the time specified on the CCSU website:
   **Wednesday, May 11, 2:00 – 4:00 pm.**

2. Please contact me privately to discuss your specific needs if you believe you need course accommodations based on the impact of a disability, medical condition, or if you have emergency medical information to share. I will need a copy of the accommodation letter from Student Disability Services at least two days before the accommodation is needed in order to arrange your class accommodations. Contact Student Disability Services, room 101, Willard Hall if you are not already registered with them. Student Disability Services maintains the confidential documentation of your disability and assists you in coordinating reasonable accommodations with your faculty. Note my contact information given on the first page.

3. In the event of a weather emergency which requires curtailment or cancellation of classes, listen to WTIC (1080 AM) or call (860) 832-3333 for the “general snow message.” You can also check on the main CCSU website under “Cancellations and Delays”.

4. The last day to withdraw from a course is Monday, April 18. Approvals for withdrawal are not required; however, it is strongly recommended that students consult with their academic advisors prior to deciding to withdraw. Cessation of attendance, notice to the instructor, or telephone calls to the Enrollment Center are not considered official notice of a student’s intention to drop the course.
After April 18 withdrawals are allowed only under extenuating circumstances and require approval of the course instructor, department chair and dean of the School of Arts and Sciences. Poor academic performance is not considered an extenuating circumstance.

5. You are responsible for understanding and abiding by the University’s policy on academic integrity. Please be careful! The internet is a useful place for information, but a dangerous place for risk of plagiarism. Do not tempt it. Not only will you not learn and thus fail the course anyway, you will also get yourself in trouble. Information on the University’s policy may be found at http://www.ccsu.edu/AcademicIntegrity/. This policy is rigorously enforced by your instructor and by the Department of Mathematical Sciences.