FOUNDATIONS OF ADVANCED MATHEMATICS 1-1:50PM SPRING 2016 SH309

Instructor:	Jonathan White
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Office:	Stuart 316
Office Hours:	10:00-10:50am MWF and by appointment
Office Phone:	399-8280
Home Phone:	362-3350 (between 7am and 10pm)
Text:	*Foundations of Advanced Mathematics*, 0.7th Edition, White (available via Jon's Central Page)
Participation:	Day-to-day class participation, presentations, and snap quizzes will be a prominent aspect of this class, and together worth 200 points.
Problem Sets:	There will be problem sets due most weeks of the semester. Together these will be worth 200 points.
Math Culture:	Math Culture Points will constitute 200 points. These are earned through various activities outside of class, as detailed on page 3 of this syllabus.
Exams:	There will be four small in-class examlets administered during class time. The dates of these are indicated in the schedule on the back side of this sheet. These examlets will be worth 50 points each. The final exam will be held during finals week at the date and time indicated on the back side of this sheet. The final will be worth 200 points
Grading:	Grading will approximately follow a $[92.0\%,+\infty) \to$ A, $[90\%, 92\%) \to$ A–, $[87\%, 90\%) \to$ B+, $[82\%,87\%) \to$ B, $[80\%, 82\%) \to$ B–, $[77\%, 80\%) \to$ C+, $[72\%, 77\%) \to$ C, $[70\%, 72\%) \to$ C–, $[67\%, 70\%) \to$ D+, $[62\%, 67\%) \to$ D, $[60\%, 62\%) \to$ D–, $(-\infty, 60\%) \to$ F scale.
Makeups:	For fairness to those who follow the schedule, makeups for exams will be allowed only in extenuating circumstances, with documentation and advance notice when humanly possible. Late problem sets will be penalized 20% of points possible for each day late, and only accepted until others are returned.

This class is intended to achieve several goals, but primary among them is to give some accurate idea of what mathematics actually is. The specific content of the course is secondary, but my hope is to give a good exposure to many topics which are helpful or necessary to further study in mathematics and related fields. These include, but are not limited to, the basics of number theory, set theory, functions, logic, and combinatorics.

This course will be profoundly different, both in subject matter and in daily conduct, than what most of you are accustomed to in a math class. Please understand that it's different on purpose, with very clear reasons in mind. It is extremely important that you come to class each day prepared to do several of the upcoming problems. You will probably have to find different ways to learn things in this class than in any math class you've taken before. Don't let that be overwhelming, and remember that I'm around to help.

"Doubt everything at least once, even the proposition that two times two equals four."
– Georg Christoph Lichtenberg (1742-1799)

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Tentative Schedule

1/11 Parity	1/13 Beyond Parity	1/15 Divisibility
1/18 No Class – MLK Day	1/20 Modular Arithmetic	1/22 Basic Logic
1/25 Quantification	1/27 Proof Techniques: Contradiction	1/29 Proof Techniques: Induction
2/1 Proof Techniques: Cases	2/3 Proof Technique	2/5 **Examlet 1**
2/8 Sets	2/10 Operations on Sets	2/12 Arbitrary ∪ and ∩
2/15 Inequalities	2/17 Real Intervals	2/19 Absolute Values
2/22 Cartesian Products	2/24 Russell's Paradox	2/26 **Examlet 2**
2/29 Functions	3/2 Operations on Functions	3/4 Composition
No Class – Spring break		
3/14 Injectivity and Surjectivity	3/16 Inverses	3/18 Countability
3/21 Uncountability	3/23 The Continuum Hypothesis	3/25 **Examlet 3**
3/28 Relations	3/30 Properties of Relations	4/1 Equivalence Relations
4/4 Relations as Sets	4/6 Relations as Graphs	4/8 Graphs
4/11 Graphs	4/13 Directed Graphs	4/15 **Examlet 4**
4/18 Combinatorics	4/20 Probability	4/22 The Peano Axioms
4/25 The Peano Axioms	4/27 The Peano Axioms	
Final Exam – 2pm on Friday 4/29		

Any students with disabilities which might affect their performance in this class should contact me as soon as possible to arrange accommodations.

Coe's faculty has adopted an academic integrity policy. It is your responsibility to understand and follow it.

FERPA information can be found on page 42 of the 2015-2016 catalog.

Diversity, in all its forms, is valuable.

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Math Culture Points

A portion of the grade for this course will take the form of Math Culture Points. These will be earned through activities outside of class including, but not necessarily limited to, those listed below. Note that none of these are mandatory – there are far more opportunities than necessary to earn full credit. You should be able to select activities that are particularly relevant to you.

Activity	Points	Max #
Colloquium Attendance	10	–
Colloquium Presentation	10-30	2
Meeting Attendance		2
Nebraska Conference for Undergraduate Women in Mathematics (January 29 - 31)	30	
SIGCSE Technical Symposium (March 2 - 5)	30	
University of Iowa Computing Conference (February or March?)	30	
Midwest Undergraduate Mathematics Symposium (April?)	30	
Mathematics Competition Participation		2
Mathematical Contest in Modeling (February 5 – February 9)	30	
Iowa Collegiate Mathematics Competition (February 21)	30	
Hack-a-thon (February 19-21, register by February 9)	30	
Math Culture Reading		
Some weeks specific readings will be posted on the course web page	10	–
Articles from Math Horizons	10	5
With approval, articles from *Math. Magazine*, *The College Math. Journal*, etc.	10	3
Math Club Activities (when appropriate)	10-20	5
Winter Break Book, Movies, Pi Day celebration, Speakers, Workshops, etc.		
Other Appropriate Coe or Outreach Activities		
Contemporary Issues Forum (February 3)	10	–
Chess Club Meeting	10	4
Attending a Quantitative Research Symposium Presentation	10	3
Job Shadowing in any relevant field	20	1
Other Volunteer Outreach (see page 4)	10	5

You should plan to spread your participation throughout the semester. In each case above, credit assumes both full participation and posting a brief summary/response on Moodle **in a timely manner**. These reflections should generally be between 100 and 300 words, and include both a brief summary and your personal thoughts on the event, and **must be submitted within one week of the event**, or within the specified time window for other activities. Up to three units of credit may be submitted after normal deadlines in the "Math Culture – Late" category on Moodle, but otherwise exceptions will not be made without serious extenuating circumstances.

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Volunteer Math Outreach

Below is a preliminary list of organizations that have need for help with math tutoring and related activities. To learn more, contact Kayla Lyftogt (klyftogt@coe.edu). This list is not meant to be exhaustive, but gives you at least some idea of possibilities. If you have other ideas, talk to Jon.

McKinley Middle School
Volunteer Opportunity: Help an 8th Grade Pre-Algebra teacher by working individually with kids that are struggling/behind
Various Times Throughout Day

Garfield Elementary
Volunteer Opportunity: Assist Teachers by working individually with students that are struggling/behind
Various Times Throughout Day

Boys and Girls Club
Volunteer Opportunity: Assist with Math Homework on a case-by case basis (wider range of age groups)
After School Program

Kids on Course
Work Opportunity: Commit to tutoring two days a week at a local elementary. T/R 3:45-5:15. Some experience with youth preferred. Up to two hours of prep time paid in addition to hours spent tutoring.
Payment: $33/hour.