MATH 361 – Real Analysis 1  
Spring 2018  
MWF 12:00 - 12:50 PM, Swords 359  

Syllabus (1/24/18)  

Instructor: Prof. David Damiano, 341 Swords, 793-2476/3374  
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Office Hours: Monday & Wednesday 1-2 PM, Tuesday 1-3 PM, Thursday 10:30 AM-12:30 PM, and by appointment.  

Course Home Page: http://math.holycross.edu/~dbd/math361/math361.html  

Course Materials: Textbook: Real Mathematical Analysis, 2nd Ed. Charles C. Pugh, Springer, ISSN 0172-6056 (electronic) Available at no charge through Holy Cross Library Ebooks to registered students. Here are the instructions for downloading the text book  

1. Go to the Holy Cross Libraries Web Page: https://www.holycross.edu/support-and-resources/holy-cross-libraries  
2. Scroll down and select Research Data Bases  
3. Search for SpringerLink  
4. Select E-Books. You’ll then be prompted for you Username and Password. This is your usual HC username and password.  
5. Select Content Type: “Book” and Discipline: “Mathematics”  
6. Search for “Charles C. Pugh Real Mathematical Analysis”  
7. Select the first option (with year 2015 in parentheses)  
8. Download the PDF. (You may also download chapter by chapter if that is more convenient.)  

Prerequisites: MATH 244 and Math 241 or permission of the instructor.  

Intended Audience: This course is designed for sophomore, junior, and senior majors with knowledge of mathematics through the department’s intermediate level courses. For majors in the classes of 2018 and 2019 this course is an elective and counts in the analysis area. For majors in the class of 2020, this is a required course.  

Introduction to Real Analysis 1: Real analysis is considered one of the theoretical pillars on which mathematics is based. The other is abstract algebra. Loosely, the course concerns the theory behind one variable calculus. As such, the broad overview should be familiar. We will address continuity, differentiation, and integration of functions $f : \mathbb{R} \to \mathbb{R}$. There is, however, much more to the course. It is really a way of thinking about mathematics. Intuitively, it is a way to think about concepts that depend on a notion of closeness. The difficulty is that closeness is a subtle idea and not so easy to define in a rigorous manner. Consequently, properties of functions that depend on closeness, like continuity, differentiability, and integrability, are also subtle. We will unpack these
concepts and see how far rigorous notions of closeness will take us.

**Topics Covered:** The text, *Real Mathematical Analysis*, follows a standard order of topics. We will cover most of the material in the text through Section 4.7, which amounts to roughly the first half of the book by page count.

**Class Format:** In addition to lectures, there will be five or six group assignments during the semester, roughly one every two weeks. We will devote one class to each of these.

**Homework:** There will be weekly homework assignments except during the weeks of hour exams. These will be due on Fridays. The five or six group assignments will be due roughly a week after they were assigned. These will not be due on Fridays. Homework assignments will be posted on the course web page.

**Colloquium Reports:** There will be 7 to 9 colloquium talks this semester. These are 50 minute late afternoon lectures by a guest speaker on a subject of their choice. Three or four of these will be by candidates for a position in applied mathematics the department is hiring for. You should attend four of these talks over the course of the semester. For each talk you should write up a brief report, less than a page typed, that (1) summarizes the presentation, (2) comments on how understandable it was to you, (3) how interesting it was to you, and (4) if they are a job candidate, would you want to take a course from them if they were hired. Your reports should be submitted within a week after the talk. If you are unable to attend four of these lectures because of other commitments (athletic practice for example), please talk to me about alternative activities you might do.

**Exams:** There will be two hour exams, one during the week of February 26 to March 2 and one during the week of April 9 to April 13. These will be in the evening and will last 90 minutes. We will set a date for these during the first week of class. If you are unable to take the test at the decided upon time, you may take it during the day in the same week. These will focus on definitions, examples, statements of theorems, and short proofs. Sample tests will be posted on the course web page.

**Final Exam:** The final exam will be a comprehensive exam given during exam period. It will be similar in style to the hour exams. A sample final exam will be posted on the course web page.

**Grading:** There are several components to the course grade.

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<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Homework</td>
<td>20%</td>
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<tr>
<td>Collaborative Assignments</td>
<td>10%</td>
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<tr>
<td>Colloquium reports (4)</td>
<td>5%</td>
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<td>Midterm Exams (2)</td>
<td>40%</td>
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<tr>
<td>Final Project</td>
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<td><strong>Total</strong></td>
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**Academic Honesty:** The Department of Mathematics and Computer Science adheres to the College’s policy on Academic Honesty, which may be found in the College Catalogue. In addition, the department has formulated the attached statement intended to amplify the policy as to how it might apply in mathematics and computer science.

**Semester Schedule**

Homework will be assigned on the due date of the preceding assignment.

- Friday, February 2, Homework # 1 due
- Friday, February 9, Homework # 2 due
- Friday, February 16, Homework # 3 due
- Friday, February 23, Homework # 4 due
- Week of February 26, Hour Exam #1, TBA in an evening. Tentatively covering through Section 2.5
- Friday, March 16, Homework # 5 due
- Friday, March 23, Homework # 6 due
- Friday, April 6, Homework # 7 due
- Week of April 9, Hour Exam #2, TBA in an evening. Tentatively covering through Section 4.1
- Friday, April 20, Homework # 8 due
- Friday, May 4, Homework # 9 due
- Final exam during exam period. Time and date TBA by the registrar.