

College of the Holy Cross
Math 243 - Mathematical Structures
Spring 2020
Professor Ballantine

Course Times and Location

TTh 2:00–3:15 PM in Swords 359

Instructor Information

Office: Swords 323

Office Phone: 793-3940

e-mail: cballant@holycross.edu

Office Hours:

Monday 1:00 – 2:00 pm

Tuesday 10:00 – 11:00 am

Wednesday 2:00 – 3:00 pm

Course website

<http://math.holycross.edu/~cballant/math243-s20/math243-s20.html>

Text

The manuscript *Mathematical Structures* by Prof. Andrew Hwang, which was prepared specifically for this course. We might also use supplemental readings on occasion. These will be handed out in class.

A detailed schedule of topics is posted on the website. You are expected to read the upcoming sections of the book *before* each class. You will get much more out of the lectures and class discussions this way.

Additional (optional) resource: *Reading, Writing, and Proving* by Ulrich Daepf, Pamela Gorkin. The ebook is available free of charge through the library website.

Grading Policy

Two midterm tests: 20% for the highest score and 15% for the lowest score

Homework: 20% Quizzes: 15% Participation: 5%

Final exam: 25%

Exams and Quizzes

The midterms are scheduled tentatively for Wednesday, **February 26** and Wednesday, **April 15**. They will take place in Smith Labs 154, 6:00 - 7:45pm. The exams will be designed to take about one hour but you will be allowed 90 minutes. Location TBA. The final exam is cumulative and it is scheduled by the registrar's office. Please do not make travel plans that conflict with the final exam.

There will be short quizzes (20 minutes) at the beginning of class on **February 11**, **March 24**, and **April 28**.

Homework Assignments

There will be weekly assignments, due each Thursday (except for exam weeks) at the beginning of class. The assignments will be announced on the website. Each assignment consists of two parts. Part A consists of more computational problems and will be graded by a student grader. Part B will consist of more theoretical problems and I will grade them myself. For Part B, I will post a link which you will open in Overleaf in order to use the software LaTeX to typeset your answers. More details will be discussed in the first class meeting.

Directions for writing up Part B problems:

- Write up questions neatly in the order assigned, clearly indicate which problem is which, and leave space for extensive comments. Avoid writing on both sides of the page unless your paper is thick enough that a felt-tip pen will not bleed through.

- Problem sets are due at the **beginning** of class. **NO** late assignments will be accepted without a serious documented reason. Should this happen, you need to contact me **before** the homework is due.

- Staple your assignment **before** you come to class. Do not use paper clips; "dog-earring" is not acceptable.

Mathematical Structures Workshop

Once a week there will be a workshop to discuss further examples and exercises. Time (in the evening) and location TBA. These meetings are optional but highly recommended. Students who attended them in the past performed much better on exams and quizzes. The meeting is run by a student.

Attendance

Attendance is important to me and will make a difference in the final grade in border line cases.

Academic Honesty

Both the College's and the Department's policies on academic integrity must be observed.

The College's policy can be found at

https://www.holycross.edu/sites/default/files/Registrar/academic_integrity_policy.pdf

and the Department's policy can be found at

<https://www.holycross.edu/academics/programs/mathematics-and-computer-science/node/211581/academic-integrity>

The problem sets are your chance to work through ideas and course concepts in a low-risk setting. It's far more important to learn from your mistakes on the problem sets than it is to get a high score on each assignment. Please treat written work accordingly. Don't closely mimic your classmates' work just for the sake of getting a few more homework points. This bad habit will likely result in low exam grades.

You are allowed to and encouraged to engage in *honest collaboration* with your classmates on the problem sets. Write up the first draft of each problem set entirely on your own. Let the ideas sit for a day or two. Then meet with one or two classmates and compare your ideas.

Do **not** exchange written work with classmates; doing so constitutes *dishonest collaboration*.

In submitting written work for grading, you implicitly certify that the work is written **in your own words**. (This does not mean you have made a few minor changes of word choice, but that you have understood the ideas and explained them in terms natural to you, personally.)

You must **acknowledge by name** any classmates you worked with by writing "I worked with ..." at the top of your assignment.

Except for resources I distribute in class or by email, **you may not use Internet resources or printed solutions of any kind** in this course.

No collaboration is allowed on midterms and on the final exam.

Academic Accommodations: Any student who feels the need for accommodation based on the impact of a disability should contact the Office of Disability Services to discuss support services available. Once the office receives documentation supporting the request for accommodation, the student would meet privately with Disability Services to discuss reasonable and appropriate accommodations. The office can be reached by calling 508-793-3693 or by visiting Hogan Campus Center, room 215A.

If you are already registered with Disability Services, please be sure to get your accommodation letters and deliver them to your instructors in a timely fashion. Instructors need 4-5 days advance notice to be able to facilitate the process of receiving testing accommodations.

Cell Phone Policy

If your cell phone rings during class or I see you texting, I will deduct 1% from your final grade. The only exceptions are emergencies. If your cell phone rings during class and you bring a note from the class dean documenting the emergency, the 1% policy does not apply.

Some Notes on Succeeding in a 200-Level Math Course:

- For most of you, this course will be your first experience in writing proofs. Writing clear, convincing arguments to convey a mathematical concept is the cornerstone of higher mathematics. I will hold you to high standards where proof-writing is concerned. The skills you develop in this course will greatly impact your success in future courses. When doing assignments, don't be satisfied with simply getting through a proof. Once you have the framework in your scrap notes, think about how to write up the proof in the most logical, readable, and convincing fashion. Work on using good notation and being concise.
- Study your notes and the sections covered, and read ahead for the sections to be covered during the next class. Do this with paper and pencil at hand. It is helpful to work out additional examples and to fill in extra details on proofs done at the board in class. Make note of any questions that arise, and come to office hours to ask them.
- Concepts in this course rapidly build on one another. Definitions and theorems from the early part of the course will need to be readily accessed later in the course. Make it a point to **memorize definitions and proof strategies** early on, and keep refreshing these points as we go through the semester.
- Be persistent and realize that some homework problems will take both time and inspiration. Expect to work hard, and **always start assignments early**. If you start an assignment the day before it is due, you will be very unhappy. Trust me on this one.
- If you've been beating your head against a proof, it's best to leave the problem and do something else for a while. You'll be surprised at how much your brain can accomplish when you leave a problem simmering on the back burner.
- When doing proofs, remember to think "what do I know?" and "what must I show?" Translate the hypotheses and conclusions into useful terms. This means applying definitions, and specializing them to the given situation. This simple strategy usually helps you see how to get started and sometimes uncovers most or all of a proof!
- Doing a proof is a multi-stage process. Generating several pages of scrap work with various attacks, some completely unsuccessful, is the rule rather than the exception. In the interest of saving trees, feel free to take scrap paper from the big stack in my office whenever I am around.
- Expect to make use of office hours, and expect to spend a minimum of 10 hours a week studying and doing homework for this course. However, if you find you are spending considerably more time than this, please discuss it with me. I can offer you suggestions on how to more effectively focus your study time for this type of course.