Syllabus for MATH 110: Discovering in Mathematics

Fall Semester 2019

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Office Hours: M: 2:30-3:45pm, T: 3:45-4:45, W: 1:00-2:30pm, F: 1:30-2:30pm, and by appt.
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Class: held TTh 2:00-3:30pm in Napier 201
Textbook: *The Heart of Mathematics, 4th edition*, by Burger and Starbird
Website: http://math.hws.edu/eking/Discovering/math110.html

Course Content and Goals

The main goal of this course is to increase your understanding and appreciation of mathematics by learning about topics not covered in typical high school courses. In addition, as the authors of our text might say, we hope to increase your ability to think effectively. Some of the topics we will cover include numerical patterns, infinity, voting methods, and graph theory. We will explore the mathematical beauty of these topics and see that some are related to our everyday lives while some are simply beautiful and intriguing on their own. We will emphasize not only learning the material itself but also exploring the process by which we learn it. Your task will be to learn by discovering and verbalizing your thought processes rather than by listening to someone give you the answers. Think of yourself as an explorer setting off to discover new lands . . . and being required to write a blog for your sponsor about your discoveries and how you found them! As is usually the case with classes for non-majors, the idea is to give you an opportunity to see and experience what people in the field, in this case mathematics, do.

I really enjoy this course in part because we have no set agenda and can stop to enjoy a particular topic as long as we wish. Another reason I enjoy it is because I have seen many students, who think of themselves as non-mathematical at the beginning of class, discovering mathematical patterns and proofs on their own and getting excited about them. By the end of this course, I hope you find some new topics that interest you and become comfortable with the idea of exploring patterns and discovering mathematics.

This course significantly addresses Goal 3: the Quantitative Reasoning Goal.

Prerequisites and Expectations

There are no formal prerequisites for this course. If you come to class with an open mind, an interest in learning about mathematics and a willingness to ask questions, experiment, and work hard, you should do well. You do not need to know any mathematics beyond arithmetic and a bit of elementary algebra and geometry. However, you will be expected to generate your own approaches to questions and solutions and you will be required to articulate your process **in writing**. You should expect to do as much writing as calculating, to spend time before each class actively reading the text with pencil and paper in hand, and to give yourself plenty of time to work through each problem set. Although there will be some lectures, meetings will mostly consist of class discussions and group work in which you are expected to actively participate.

Outline of Topics

This outline is meant to give you a general idea of how we will proceed through the text. It will be adjusted as necessary during the term.

Weeks/Dates	**Sections**	**Topics**
Week 1	1.1–1.4	An Introduction to Rigorous Thought
Weeks 2–6	2.1–2.7	Number Contemplation
Thursday, October 3	Exam 1	Chapters 1–2
Week 7	10.4	Voting Strategies, Project Assigned
Weeks 8–11	3.1-3.5	Infinity
Friday, October 25	Project Due	Codes
Thursday, November 7	Exam 2	10.4 and Chapter 3
Weeks 12–15	6.1–6.4 and handouts	Graph Theory
Monday, December 16	Final Exam	Cumulative

Supplies

In addition to the usual pencils, erasers, and paper, you will need a half-inch or one-inch (not larger please!), three-ring binder to use as a journal. Your class notes should be kept in a different notebook (the type of your choosing) from your journal. Please also obtain access to a stapler (This does not require buying one. For example, there is a stapler available for use in the library for free.); collected work on more than one page should be stapled (not clipped) before submission. During the second week of classes, you will be asked to bring a pineapple to class. It may be useful to have a basic calculator in some classes, but you are not required to own one. I will provide calculators for the exams.

Journal

The journal exercises should be worked on the handout form (hard copies of which will be available in class and outside my office, and a pdf will be on our website) and placed in your journal. Reading and journal exercises will be assigned daily. Check the course website after each class for the assignment. You are encouraged to find a partner or two with whom you can work on some of these problems. Your journal should **not** contain class notes or collected homework sets. **Clearly label the outside of your journal with your name**. Follow these guidelines for your journal work:

- Do your assignment on the journal entry forms.
- Keep the exercises in your journal in the order in which they are assigned.
- Label each exercise by section and exercise number on the spaces provided on the form.
- Briefly describe the problem and/or draw a diagram if helpful/required.
- If unable to fully complete the problem, show attempts and why they did not work. (Note that this is helpful for partial credit!)
- If you work with others, list their names in the space provided.

I will collect the journals at each exam. It is to your advantage to work carefully and thoroughly through all journal work before the next class period. Daily work on journal exercises should help you understand what is being covered in class and prepare you to do well on groupwork, problem sets and exams. Each journal check will be worth 60 points. I will be looking for solutions to some

of the exercises, but the majority of your grade will be based on evidence of your overall effort put into exploring topics and creatively searching for solutions. Your journal work will be 10% of your course grade.

Collected Homework Sets

Roughly once a week you will turn in a homework set, usually due on Fridays by 2pm. Note that you may always turn in your homework early, for example, at the beginning of the class before they are due. See our website for details about homework assignments and due dates. Solutions should be written neatly or typed, and stapled if you have more than one page. You must show all work to receive credit. Although I encourage you to discuss ideas for most exercises with other class members, your write-up must be your own individual work. (Read assignments carefully to determine when collaboration is not permitted.) You should attempt the exercises on your own before consulting your classmates or attending my office hours. Many exercises will require a written explanation of the process you used in order to answer the question. The processes you use will most likely be different from those of the rest of the class. Take notes while discussing ideas with your classmates, but decide on the final organization and wording of your write-up on your own. Your work should be your own expression. This means you should not share or have someone else look at your collected homework before it is graded. You are required to list anyone with whom you discussed the homework. Assignments will be considered late if they are not turned in by the time and date they are due. You may turn in two late assignments (any time before Sunday at 1pm, 47 hours after it is due) without penalty. I will also drop your lowest homework grade. Use these wisely! Beyond your two free lates, there will be a 10% penalty for each 24 hour period an assignment is late after the due date and time up to four days. Anything turned in four or more days late will have a 50% penalty. Be sure to turn in everything! Work will receive at least partial credit up until the time I return assignments to the class. Each assignment will be worth 30 points. Neat work (including stapling if more than one page, and no jagged-edged papers, in addition to neat writing or typed papers) will earn one bonus point.

Bonus: You will have the opportunity to earn bonus points toward your homework grade. The Mathematics and Computer Science Department has seminar talks regularly. Each seminar talk you attend can earn you up to five bonus points (you must be present and attentive for the entire talk to receive full credit), with a maximum of fifteen points possible.

Homework sets will constitute 23% of your course grade.

Project

You will be required to complete one project, which will be on codes. These projects will be done in groups. Details of the project will be discussed after the first exam and it will be due on Friday, October 25th. The project will be worth 12% of your course grade.

Exams

There will be two midterm exams in class, one on Thursday, October 3rd, and one on Thursday, November 7th. The final exam will be on Monday, December 16th from 7:00pm until 10:00pm. The midterm exams will each be worth 15% of your course grade and the final exam will be worth 20% of your course grade. It is impossible to construct fair makeup exams in mathematics. Thus for your protection, my policy is that there are **no** makeup exams. Write the above dates in your calendar. **You must be present for all exams.** Make your travel plans accordingly.

Participation

Attendance and active participation are vital parts of the discovery process. To succeed in this course you must not merely memorize facts, but rather earnestly engage in the creative journey of developing and understanding mathematical concepts. Participation will count as 5% of your course grade. **More than two unexcused absences will result in a participation grade of zero. Note that this lowers your grade by at least one third of a letter.** Excused absences require documentation such as a letter from a dean. **Habitual tardiness will also lower your grade. Four unexcused absences will result in a negative participation grade and more than four absences will likely result in automatic failure of the course.** If you must miss a class for some reason beyond your control, talk to me about it in advance, when possible, and obtain a written excuse. Common courtesy demands that you are on time for class, that your cell phone is turned off and stowed during class, and that you do not leave the room during class (unless you are ill). This will help you, your classmates, and me to give our full attention to the course.

Disclaimer

The above exam dates, quantity of graded work, policies, and course layout are subject to change in the event of extenuating circumstances.

Academic Integrity

I highly encourage you to form a small group with whom you can discuss some of the journal work and collaborative assignments. Verbalizing your questions, explaining your mathematical ideas and listening to others will increase your understanding. However, you should **not** feel free to copy someone else's work, ask someone else to edit your work, edit someone else's work, **or** make your work available to someone else. **Copying constitutes plagiarism, a violation of academic integrity which could result in failure in the course. Absolutely no collaboration or use of outside resources will be allowed on exams.** Violation of the Colleges' Principle of Academic Integrity may result in a report sent to your file in the dean's office and/or appearance before the Committee on Standards.

The Center for Teaching and Learning (CTL)

At Hobart and William Smith Colleges, we encourage you to learn collaboratively and to seek the resources that will enable you to succeed. The Center for Teaching and Learning (CTL) is one of those resources: CTL programs and staff help you engage with your learning, accomplish the tasks before you, enhance your thinking and skills, and empower you to do your best. Resources at CTL are many: Study Mentors help you find your time and manage your responsibilities, Writing Fellows help you think well on paper, and professional staff help you assess academic needs, to name a few. I encourage you to explore these and other CTL resources designed to inspire your very best work. You can talk with me about these resources, visit the CTL office on the 2nd floor of the library to discuss options with the staff, or visit the CTL website at http://www.hws.edu/academics/ctl/index.aspx.

If you are a student with a "disability" (or what I like to call a "nontraditional approach to learning") for which you may need academic modifications in this course, you should self-identify, provide appropriate documentation of your disability, and register for services with Disability Services at the Center for Teaching and Learning (CTL). Disability related modifications and services will not be provided until the registration and documentation process is complete, but I will be happy to work with you once I receive the documentation from the CTL. The guidelines for documenting disabilities can be found at the following website: http://www.hws.edu/academics/ctl/disability_services.aspx

Please direct questions about this process or Disability Services at HWS to Christen Davis, Coordinator of Disability Services, at ctl@hws.edu or x 3351.

How to Succeed

- Start homework assignments as soon as possible after they are assigned!
- Prepare for class by completing all homework on time.
- Turn off all cell phones, etc. and keep all phones, iPads, etc. stowed during class.
- Attend all classes and labs on time.
- Ask questions and participate in class.
- Dare to be wrong! Answering a question incorrectly is actually much more interesting than answering it correctly! Start conversations with your ideas!
- Remain seated and attentive during all lectures, presentations and whole class discussions.
- Review class notes and read the text before each class.
- Discuss questions and journal exercises with your classmates.
- Listen carefully to other students' ideas.
- Work in concert with your group members to develop solutions that make sense.
- Write up your homework alone, away from your classmates.
- Come to office hours, make an appointment, or email me whenever you have questions.
- Have fun!

Homework: Questionnaire and Small-Group Meeting

The first part of this assignment involves going to the class website: http://math.hws.edu/eking/Discovering/math110.html, printing the autobiographical questionnaire, filling it out and turning it in at the beginning of our next class (Thursday, August 29th). The second part is that each of you will meet with me in my office for about ten minutes. You will meet in groups of two or three. I will provide a sign up sheet to schedule these meetings during the first two weeks of classes. Please bring a photo of yourself, with which you are willing to part, to the meeting. This meeting and the photo help me get to know each of you better and more quickly. It also ensures that you know where our course website and my office are and helps you get to know at least one of your classmates as well. Your grade on this assignment, out of 15 points, will be based on your prompt completion of the questionnaire and attendance of our meeting, photo in hand.