Syllabus for MATH 110: Discovering in Mathematics
Fall Semester 2009

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Office: Lansing 304
Office Hours: M 1:30-3:30pm, W 2:30-4:00pm, Th 11:30am-12:30pm, F 1:30-2:30pm, and by appointment
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Class: held TTh 1:30-2:55 in Napier 201
Textbook: *The Heart of Mathematics: An invitation to effective thinking, 2nd edition*, by Burger and Starbird
Website: http://math.hws.edu/eking/math110.html

Course Content and Goals

The goals of this course are to increase your understanding and appreciation of mathematics by learning about topics not usually covered in typical high school courses, and, as the authors of our text might say, increase your ability to think effectively. Some of the topics we will cover include numerical patterns, infinity, and graph theory. We will explore the mathematical beauty of these topics as well as how each is related to our everyday lives. 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 in your ship to discover new lands . . . and being required to write reports back to your homeland 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 proofs on their own and actually getting excited about it. By the end of this course, I hope you find some new topics that interest you and become comfortable with the idea of discovering mathematics.

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. Although there will be some lectures, meetings will mostly consist of class discussions and group work in which you are expected to actively participate.

Supplies

In addition to the usual pencils, erasers and paper, you will need a spiral notebook or a composition book (NOT a three-ring binder) to use as a journal. During the second week of classes, you may be asked to bring a pineapple to class. You may find other supplies such as scissors, colored pencils or markers, and tape, useful as well. Please also obtain access to a stapler (there is one located in Lansing 310); collected work on more than one page should be stapled before submission.

Journal

The journal exercises, not surprisingly, should be worked in the spiral notebook or composition book serving as your journal. Reading and journal exercises will be assigned daily. Check the course website or the posting outside my office 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 homework sets, but do include any additional thoughts or observations you have about the class. Follow these guidelines for your journal work:

- Complete the exercises in the order in which they are assigned.
- Label each exercise by section and exercise number.
- Use a highlighter to mark each label, so that it is easily identifiable.
- 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.
- Record ideas, questions, and thoughts, especially for challenging problems.
- Note with whom you worked (if anyone).

I will collect the journals at each exam. 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.

Homework Sets

Roughly once a week you will turn in a homework set (due on Fridays by 3pm). 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. Details will be given with each assignment. The processes you use will most likely be unique to those of the rest of the class. You will be required to list anyone with whom you discussed the homework. Some homework sets may include short writing assignments. No late homework will be accepted! Since illness or other unavoidable circumstances occasionally occur, I will drop your lowest homework grade. Each assignment will be worth 30 points.

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 five bonus points (with a maximum of fifteen points possible).

Homework sets will constitute 28% 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 30th. The project will be worth 10% of your course grade.

Exams

There will be two midterm exams in class, one on Thursday, October 8th, and one on Thursday, November 12th. The final exam will be on Thursday, December 17th from 1:30pm until 4:30pm. The midterm exams will each be worth 14% of your course grade and the final exam will be worth 18% 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 6% of your course grade. Missing more than two classes will severely affect your participation grade. If you must miss a class for some reason beyond your control, talk to me about it in advance.

Disclaimer

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

The Center for Teaching and Learning (CTL)

Hobart and William Smith Colleges encourages students to seek the academic collaboration and resources that will enable them to do their best work. Students who would like to enhance their study skills, writing skills, or other academic skills may visit the CTL website at http://www.hws.edu/academics/ctl/index.aspx or contact the CTL at x3351.

If you are a student with a disability for which you may need accommodations, you should self-identify and register for services with the Coordinator of Disability Services at the Center for Teaching and Learning (CTL), and provide documentation of your disability. Disability related accommodations and services will not be provided until the registration and documentation process is complete. The guidelines for documenting disabilities can be found at the following website: http://www.hws.edu/disabilities. Please direct questions about this process or Disability Services at HWS to David Silver, Coordinator of Disability Services, at silver@hws.edu or x3351.

Academic Integrity

I highly encourage you to discuss the reading and journal exercises with each other in addition to attending office hours. 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 or make your work available to someone else. **Copying constitutes plagiarism, a violation of academic integrity which could result in failure in the course. There is, of course, no collaboration or use of outside resources 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.

How to Succeed

- Attend all classes on time.
- Remain seated and attentive during all lectures, presentations and whole class discussions.
- Ask questions and participate in class.
- Review class notes and read the text before and after each class.
- Begin working on homework as soon as it is assigned.
- Discuss questions and journal exercises with your classmates.
- Make sure other students in your group understand what the exercises are asking.
- Listen carefully to other students' ideas.
- Work in concert with your group members to develop solutions that make sense.
- Come to office hours, make an appointment, or email me whenever you have questions.
- Have fun!

Essay Assignment

This assignment will contribute to the non-exam portion of your grade. Write a full one-page typed (usual font size and margin widths) autobiography. Discuss the reason you chose to take this course, as well as your favorite and least favorite memories of mathematics. When someone mentions mathematics, what is your initial reaction? How would you define mathematics? Has this definition changed since our first class? Also discuss your major and minor (or what you think they will be), what you hope to do with your college degree, your favorite hobbies, and anything else interesting (for example, what you did over the summer). The paper is due at the beginning of our next class (Thursday, September 3rd), when you will sign up for a short one-on-one meeting with me in my office. Please bring a photo of yourself with which you are willing to part (a good photocopy of your student ID is acceptable) to the meeting. This meeting and the photo help me get to know each of you better and more quickly. Your grade on this assignment will be based on whether you address all the topics requested, as well as the quality of your writing (including good grammar and typography) and your prompt attendance of our meeting, photo in hand. This assignment is worth fifteen points.