MATH 4394 Senior Project
J. Roberto Hasfura B.
Spring 2020

Schedule: T 2:10-3:25 p.m. in Room MMH 225
Office Hours: Open door policy. I will be in my office for sure on MW from 1:30 to 3:00 p.m.
Instructor's Coordinates: Office: MMH 115 K; Phone Extension: X8240;
E-mail Address: `jhasfura@trinity.edu`

All information pertinent to this course, including a copy of this syllabus, can be found in the course's TLearn page.

Class Attendance. Attendance and punctuality are mandatory. You should inform the instructor as early as possible when you know in advance that you will need to miss class, be late for a class, or leave a class early. (Class ends at 3:25 p.m.) The unexcused missing of class time will result in a deduction of attendance points according to the following criteria:

- Tardiness or early departures will first earn a warning; each subsequent violation will result in a 5-point penalty;
- Each unexcused absence will result in a loss of 10 points.

Each student may submit up to two written reports, worth 10 points each, to make up for point deductions due to attendance. These reports must be written in LaTeX and must be submitted no later than two weeks after the missed date.

Class Demeanor and Participation. Students will be expected to participate in the seminar by showing proper respect (notably giving full attention to the speakers) and engaging in the discussion. Students found doing work for other classes, texting, surfing the internet or engaging in any other type of inappropriate behavior will have points deducted at the discretion of the instructor. Students will not be allowed to sit in the back row unless no other seating is available.

Evaluation. Your overall score in the course will be based upon attendance; participation; the quality of your work on the senior project; and your completion of the ETS Major Field Test for Mathematics. Attendance and participation expectations were given earlier; details for the other components of your final grade are given later in this document. The point values are as follows:

Attendance:	10 points
Participation:	10 points
The Senior Project	
Written Component:	45 points
Oral Component:	35 points
ETS Test Completion:	10 points
Total:	110 points

The Senior Project

The Senior Project. Under the guidance of a faculty member in the mathematics department, you will engage in a project of enough substance to justify the three credit hours that successful completion of this course earns; you will report the findings in your project in both oral and written forms.

Project Categories. There are six different categories of senior projects. Most projects should fall in categories (1-3). For a project in categories (5) or (6), a synopsis of the project must be submitted and approved by the seminar instructor **before** the first oral presentation. The synopsis will include the description of the project and the grading guidelines. The six different categories that determine the criteria for grading senior projects are:

1. *Expository Research.* The student studies and presents advanced mathematical concepts and results, combing a variety of resources, motivating and explaining the topics studied well. The project is written as a self-standing study of the topic, at the appropriate level.

2. *Applied Project.* The student combines advanced mathematical results with meaningful applications, clearly explaining the benefits of using mathematics to solve the problem presented.

3. *Interdisciplinary Project.* The student demonstrates uses of mathematics in an interdisciplinary project in a novel, or unusual way, combining a variety of resources and approaches.

4. *Original Research.* The student presents his or her original solution to a mathematical problem, or a part of a problem, at a level appropriate for a senior project.

5. *Education or History Project.* The student explores questions in mathematics education, history of mathematics or a similar area in a creative way.

6. *Other.* A topic or a different idea (e.g., internship project) must be agreed upon by the seminar instructor, faculty adviser and the student by the deadline for the senior project topic and adviser selection.

Selecting a Project adviser. Students must select a faculty member in the mathematics department as a senior project adviser, and submit a PDF file with the adviser's name, a brief description of the project, and the category in which the project will be submitted. This report is **due before noon on Friday, January 31**. Submission of the project is done via e-mail. You should include motivation, goals, and how the project should be evaluated. Ideally, the adviser and student should set deadlines to ensure both are on track with the project. Failure to send the proposal will result in a deduction from the participation grade.

Written Component.

Rough Draft. Students will submit a rough draft of their report, typed in LaTeX, to both the instructor and their faculty adviser. This is due **before noon on Friday, March 6**. Students will submit PDF and TeX files of the draft on TLearn or e-mail. Both the faculty adviser and the seminar instructor will provide feedback on formatting, sources and general issues. This portion is worth 5 points and it will be given after consultation with the adviser.

Feedback. During the semester, the faculty adviser will provide suggestions and feedback about the written report. The student must be able to improve her/his writing in response to feedback, in particular after the rough draft is submitted. This portion is worth 5 points and it will be given

by the faculty adviser.

Final Report. The research topic, or the problem under study, should be clearly laid out in the paper. There should be a motivation for the concepts or the problem studied. You should explain where it fits in its mathematical realm, our general knowledge, or how it applies in other disciplines. You are expected to demonstrate understanding and mastery of technical details at an advanced mathematical level by exhibiting arguments and proofs with a level of detail appropriate for a senior project. Both quality and quantity will be assessed. Thus, you should use precise and unambiguous mathematical terminology and language and include definitions of important concepts. In addition, you should provide appropriate examples, analogies, counterexamples, etc.

We expect that you paper will include an introduction, definitions for all technical terms particular to your topic, a main body with the development of the topic including at least some proofs, a conclusion, and references. It should also be at least 15 pages long using a 10- to 12-point font size. These are generic guidelines. You and your adviser can decide on what is appropriate. It is your responsibility to let me know if you and your adviser are considering changes to these expectations.

Please submit a PDF file of the final report, and a copy of the TEX file with any supporting files, by e-mail or on TLearn. Indicate under which category the project will be graded; normally, this choice must match the original approval, but under special unforeseen circumstances the instructor can grant permission to change this designation. You may also submit a hard copy of the final report, typed in LATEX, to both the instructor and your adviser. The final report is due **before noon on Monday, May 11**. This portion is worth 35 points and it will be given after consultation with the adviser.

This course satisfies the Oral and Visual Communication (OVC) core capacity of the Pathways curriculum

Accordingly, upon successful completion, students will have demonstrated the ability to:

- identify and use the elements of effective oral and visual communication;
- create and deliver effectively structured oral presentations using language correctly and appropriately;
- use visual media that are effective, appropriate, and well integrated into the presentation;
- analyze and critique oral and visual components of presentations;
- respond effectively to questions and comments from audience members.

To that effect, students in this course are required to complete the following

Oral Component. You will give two class presentations of your senior project:

i A 16- to 20-minute preliminary report of the project (this will take place on **February 18 and 25**);

ii A 27- to 31-minute final presentation (this will take place on **April 14, 21 or 28**).

Preliminary Presentation. This presentation should be an overview of the topic of your senior project. It should include enough background information that the students in the seminar understand the main problem and realize its relevance. This presentation must be done in LaTeX and will take place **on February 18 and 25**. The PDF file for the presentation must be sent to the seminar instructor via e-mail before **noon on the day of the presentation**. This portion is worth 4 points and will be assigned in consultation with the adviser.

Feedback. During the semester, the faculty adviser and the student must meet and discuss both the technical content of the project as well as elements of effective oral and visual communication. The faculty adviser will provide feedback to help the student analyze and critique oral and visual components of the presentation. The student is expected to improve the presentation based on that feedback.

Rough Draft of Final Slides. Students must submit a draft of the slides to the faculty adviser and the seminar instructor **one week before** the final presentation. They will provide feedback with respect to content and also readiness and formatting. For example, are the colors appropriate and colorblind-safe? Are the fonts and sizes appropriate? Does it include citations? Does the student have a nearly finished product? This portion is worth 6 points out of 35 and it will be given after consultation with the adviser.

Final Presentation. This presentation, too, must be prepared in LaTeX. The PDF and TEX files of the the final version of each presentation, and all supporting files including figures, must be submitted via email **before noon on the day of the presentation.** The final presentation will be graded by all attending faculty according to a rubric that has been posted in the course's TLearn site. This portion is worth 25 points.

Participation. Since the bulk of the work for the senior project will be done with a faculty adviser, the participation points will be given jointly by the seminar instructor and the faculty adviser. Failure to meet with your adviser regularly during the semester or failure to participate in the seminar in a reasonable manner may result in a loss of 10 points.

ETS Major Field Test. This is a capstone course and the department has decided to add a requirement to this course. On **Thursday, April 30 at 2:10 p.m.**, you will take a comprehensive test of standard undergraduate mathematics administered by the ETS. The ten points corresponding to this part will be awarded for spirited completion of the test.

Submissions. At several times during the semester you may need to submit documents electronically via e-mail. When you do send an e-mail with course documents, please include `MATH-4394` and your last name in the subject line.

Academic Honor Code. All students are covered by a policy that prohibits dishonesty in academic work. Under the Honor Code, a faculty member will (or a student may) report an alleged violation to the Academic Honor Council. It is the task of the Council to investigate, adjudicate, and assign a punishment within certain guidelines if a violation has been verified. Students who are under the Honor Code are required to pledge all written work that is submitted for a grade:

"On my honor, I have neither given nor received any unauthorized assistance on this work" and their signature. The pledge may be abbreviated 'pledged' with a signature.

Students with disabilities. If you have a documented disability and will need accommodations in this class, I expect that you will deliver your accommodation letter to me during my office hours early in the semester so we can discuss how I might prepare to meet your needs. Please make these arrangements with me as soon as possible once you have met with the SAS Coordinator and have picked up your accommodation letters. All discussions will remain confidential. If you have not already registered with Student Accessibility Services, contact the office at x-7411 or `SAS@trinity.edu`. You must be registered with SAS before I can provide accommodations.