MTH 391 A:
Senior Seminar I
Course Syllabus
Fall 2026

INSTRUCTOR: Brent Young
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EXTENSION: 3824
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OFFICE HOURS: MTWF 9:00 – 9:50am, MW 1:00 – 1:50pm

REQUIRED TEXT: *Mathematics and Its History, 3ed.*
John Stillwell,
Springer, New York, NY, USA (2010)
ISBN: 978-1-4419-6052-8.

CLASS MEETINGS: M 2:00 – 2:50pm in SLC 411

PREREQUISITES: Enrolled students should be in good academic standing as either a junior or senior mathematics major. In addition, it is assumed students have successfully completed either MTH 311 (Real Analysis) or MTH 331 (Abstract Algebra I) with a minimum grade of 2.0 (or by permission of the department).

COURSE DESCRIPTION: Presentations and discussions of selected topics in mathematics, conducted by students and faculty.

DETAILED OBJECTIVES: Upon successful completion of the course, students will:

- Read and comprehend mathematics as found in professional journals;
- Develop written communication skills through expository writing that not only incorporates proof writing and problem solving but also constructs narratives to place the mathematics into context;
- Develop communication skills through oral presentations, including visual aids, in a seminar atmosphere that provides support as well as constructive criticism;
- Acquire insights into the dynamic nature of mathematics and interdependence of its various branches; and
- Construct documents essential to the mathematics workplace, including technical reports, progress reports, slide presentations, etc.

GRADING: Your final grade will be computed as follows:

- Research Project: 60%
  - Approval of research project proposal: 5%
  - Submission of presentation abstract: 5%
  - Seminar presentation: 30%
  - Written research paper: 20%
- Other Items: 40%
  - Written Summary (from a chapter of *Mathematics and its History*): 10%
  - Problem Sets: 15%
  - Biweekly Progress Reports: 10%
  - Adherence to Deadlines: 5%

WRITTEN RESEARCH PAPER: Each student is required to produce a well written, correctly formatted, and mathematically accurate research paper which summarizes the work/research completed on your selected research topic. Your paper should be written in the form and tone of a research article that one might find in a published journal (i.e., not an expository paper with little to no actual analysis).

General guidelines for content to keep in mind in constructing your paper include the following:

- The paper should be self-contained in that all necessary background information, basic definitions, and examples should be explicitly laid out so that the reader can read through it without having to consult outside sources.
- The paper may assume the general background material that is covered in core mathematics courses or upper level elective courses completed at Wilkes.

- The paper should be written in a way that is understandable to your fellow math majors. One suggestion is to have other senior math majors read your paper for clarity and correctness.
- Any diagrams or calculations that are essential to the understanding of the paper should be included. An appendix or ancillary material may be placed at the end of the paper if it helps fill in any gaps.

The format of the paper should adhere to the following:

- The paper must be written in the typesetting software LaTeX using the `article` document class with 12 point font.
- The paper should be roughly 10 to 15 pages long but should not exceed 20 pages.
- Referencing and footnotes should follow the AMS citation style.
- An appropriately formatted bibliography must be included.

Students can sign up for a free account with Overleaf to handle all typesetting in LaTeX.

SEMINAR PRESENTATION: The creation of an oral presentation should flow naturally from your completed written research paper. The manner and style in which you choose to present is up to you and your faculty sponsor. The majority of the semester should be utilized for reading, researching, and understanding the research topic. Your oral presentation will be evaluated on correctness, completeness, clarity, and presentation style.

As with the research paper, the faculty sponsor serves as a resource during the research and comprehension of your topic,providing assistance when needed, they are not responsible for ensuring your understanding. It is each student's responsibility to read and understand the content of the research topic. The faculty sponsor should not have to lecture and repeatedly explain the topic to you.

Please note the following important dates related to your oral presentation.

- PRESENTATION ABSTRACT: A roughly 100–word abstract of your presentation will be due by noon on Monday, December 1, 2025.
- PRESENTATION DATE: Student presentations are scheduled for Saturday, December 6, 2025 at 9am. All students are expected to be present for all presentations.

CHAPTER SUMMARY: There are many important results in mathematics, and no doubt you have encountered some of them in your coursework. John Stillwell's book, *Mathematics and its History* (M&IH), is a compilation of some important mathematical results through time. The book is arranged by topic, and is written in a clear and casual manner so it is easy to understand what is sometimes complicated mathematics.

To gain an appreciation of some of these results and to learn about some of the history behind them, each student will select, read, assimilate, and provide a short

research paper based on a chapter from *Mathematics and its History*. The length of your paper will depend on the chapter you select, and how much detail you choose to include.

You are expected to highlight the important mathematics presented and fill in steps or details that were left to the reader in the text. You are expected to present at least one proof of a result within the context of the theorem presented in the chapter you select. The format of this short research paper should follow the same guidelines as the major research paper specified above.

As with the final research paper, the chapter summary should be written in LaTeX. Think of the chapter summary as a dry run before you attempt to type up your research paper.

PROBLEM SOLVING PRESENTATION: Problem sets are posted in the Problem Sets folder. There are two problem-solving presentations for students to present solutions to questions from assigned problem sets. The questions will focus on problem-solving techniques typically seen in calculus, differential equations, multivariable calculus, and discrete mathematics. Each student is expected to present a solution to a randomly selected problem to the class audience. Solutions should be persuasive in that solutions must be presented clearly, concisely, and be mathematically supported by known results and formulas. Your presentation will not only be evaluated on its correctness, but also on how it is presented (e.g., use of eye contact, delivery of information, etc.).

Students must attend each session prepared to present a solution to any of the assigned problems, which means you should have solutions to all problems completed and prepared for submission. Written solutions to the assigned problems are submitted digitally an hour before the problem solving sessions, so each student should make sure they have a printed version of their solutions available. Again, solutions should be typed in LaTeX.

PROGRESS REPORTS: Each student is required to submit biweekly progress reports of what was worked on during the previous two weeks as it relates to the research topic, presentation, or paper writing. The goal of submitting regular progress reports is to confirm each student is making reasonable progress on the required activities and provides an opportunity for you to reflect on what you are studying and how it fits into the "big picture" of your undergraduate studies.

Specifically, each progress report should address each of the following.

- A brief one-paragraph abstract which provides an overview of the goals, objectives, and primary topic of your talk.
- A synopsis of what you learned or problems encountered since the last progress report and how it impacts the preparation of the presentation.
- Any specifics of what you learned or discussed with the faculty mentor since the last progress report.
- Any specifics of what you hope to accomplish during the period between the submission of this progress report and the next progress report.

Failure to submit these progress reports will result in a deduction of the final course grade. The instructor reserves the right to discuss your progress reports with your faculty sponsor.

INDIVIDUAL MEETINGS: The semester schedule specifies that each student is required to meet with me individually on a regular basis during the semester. These meetings supplement the written progress reports, and allow let me ask additional questions about your research and other aspects of the course that may not be addressed in your written progress reports. Each meeting should not take more than 15 minutes provided everything is moving along smoothly.

Each student is responsible for arranging a date and time for this meeting. An email should be sent to me at least 24 hours in advance. Your email should include available days and times to meet during the week an individual meeting is to be completed.

In addition, students must also schedule periodic meetings with their faculty sponsor during the semester as they work through their paper and presentation. It is the student's responsibility to schedule these meetings. Note that faculty sponsors will be consulted regarding the frequency of meetings with each student.

ROUGH CALENDAR of EVENTS

Date	**Activity**	**Notes**
Fri. Sept. 11	Submit 3 ranked choices for M&IH chapter	Email by end of day
Fri. Sept. 18	Research Project Proposal due	Submit by end of day
Fri. Sept. 25	Progress Report 1 due	Submit by end of day
Fri. Oct. 2	Problem Set 1 Solutions due	Submit by end of day
Fri. Oct. 9	Progress Report 2 due	Submit by end of day
Fri. Oct. 23	Progress Report 3 due M&IH Chapter Summary due	Submit by end of day Submit by end of day
Fri. Nov. 6	Progress Report 4 due	Submit by end of day
Fri. Nov. 20	Progress Report 5 due	Submit by end of day
Fri. Nov. 20	Problem Set 2 Solutions due	Submit by end of day
Fri. Dec. 4	Progress Report 6 due	Submit by end of day
Mon. Dec. 7	Presentation Abstract due	Submit by 12pm
Sat. Dec. 12	Senior Presentations	Starts at 9am
Fri. Dec. 18	Written Research Paper due	Submit by 5pm