Math 673 — History of Advanced Mathematics

Instructor Information

Instructor:	Ben Salisbury, Assistant Professor
Website:	`http://people.cst.cmich.edu/salis1bt`
Email:	`ben DOT salisbury AT cmich DOT edu`
Office:	Pearce 206H

Office hours

5/16 – 5/19	5/23 – 5/26	5/31 – 6/3	6/6 – 6/9	6/13 – 6/16	6/20 – 6/22
10-11am	10-11am	12-1pm	12-1pm	10-11am	10-11am

. . . or by appointment.

Course Information

Meeting Times:	MTuWTh 8:00–9:50am
Meeting Room:	Pearce 223
Course Text:	John Stillwell, *Mathematics and Its History*, Third edition, Springer, 2010.

Bulletin Description: History of the development of modern mathematics from 1700 into the 20th century. Prerequisites: MTH 525 and MTH 532.

Brief Overview: In this course, we will study the modern development of mathematics, from approximately the end of the sixteenth century to the present. In the seventeenth century, geometry became analytical; geometrical arguments were replaced by algebraic ones; calculus was invented. As scientists began to apply the concepts of calculus and as mathematicians examined calculus rigorously, new vistas opened up. Entirely new bodies of mathematics – the theory of functions, differential equations, group theory, linear algebra, algebraic geometry, set theory, logic and foundations, abstract algebra, and topology – were discovered, analyzed, matured, which contributed to today's technological and scientific revolution.

Note: Since our course covers the history and development of modern mathematics from the sixteenth century onward, we will begin our course essentially from Chapter 7. That said, students are expected to complete a careful reading of Chapters 1-6 at the outset of the course. This will give you a good overview of some of the important early contributions in mathematics and the relevant historical background. There will be a quick summary of some major results from this era on the first two days of class. Some of the material in Chapters 1-6 will also provide some of the motivation and background necessary for the later chapters.

Course format: Lectures will be given by *everyone(!!)*. A schedule has been posted below in which two students will be assigned to give the lecture for a given day/chapter. The bulk of the material presented may be found in the course text, but students are encouraged to incorporate other sources to enhance their presentation. Presentations should cover the main mathematical ideas and developments of their chapter through mathematical examples, important computations, and helpful mathematical problems. Historical context should also be provided with the major mathematical contributors mentioned. Short biographies of these contributors should be included.

Daily schedule:

8:00–8:50	First part of lecture	9:00–9:40	Second part of lecture
8:50–9:00	Break	9:40–9:50	Discussion

Assessment

Rubric for daily presentations / seminar discussions

1. Present the historical component.
   (a) Trace the development within the chapter of the main idea(s). Brief biographies of the key players and describe their contributions. 20%
   (b) Relate the chapter to other chapters we are covering. 5%
   (c) Relate the chapter to today's mathematics and today's classroom. 5%
2. Grapple with the mathematical concepts.
   (a) Summarize main mathematical ideas and present the mathematics with clarity. 20%
   (b) Provide worked problems, clear examples/partially worked exercises. 20%
   (c) Post notes/slides to Blackboard by 10pm the night before presentation. 5%
3. Provide a clear and organized presentation.
   (a) Presentation must be organized and clear. 10%
   (b) Presenter(s) should be comfortable with the material. 10%
   (c) Presentation must fit into the 90-minute allotted time. 5%

Breakdown of grading scheme

Students are expected to attend every discussion, having read the relevant chapters in advance and then participating in our exploration of the history of mathematics. Students enrolled in the Ph.D. program will lead four lectures during the semester, while students enrolled in the Master's program will lead three. The daily schedule is posted below.

In addition, there will be two quizzes and a final exam. The quizzes and exam will be based both on the homework assigned and the lectures.

Presentations	100 points each
Quizzes	40 points each
Class Participation	20 points
Final Exam	100 points

Schedule

Date	**Topic**	**Speaker(s)**
5/16	Review of some of Chapters 1–3	Salisbury
5/17	Review of some of Chapters 3–6	Salisbury
5/18	Chapter 7 — Analytic Geometry	Salisbury
5/19	Chapter 8 — Projective Geometry	Salisbury
5/23	Chapter 9 — Calculus	Broe, C. Grow
5/24	Chapter 10 — Infinite Series	Alyousef, Jansrang
5/25	Chapter 11 — The Number Theory Revival	Domagalski, A. Grow
5/26	Quiz 1	———
5/31	Chapter 12 — Elliptic Functions	Khaitan, Vasquez
6/1	Chapter 13 — Mechanics	Broe, James
6/2	Chapter 14 — Complex Numbers in Algebra	A. Grow, C. Grow
6/3	Chapter 15 — Complex Numbers and Curves	Domagalski, Jansrang
6/6	Chapter 16 — Complex Numbers and Functions	Khaitan, James
6/7	Chapter 17 — Differential Geometry	Alyousef, Vasquez
6/8	Chapter 18 — Non-Euclidean Geometry	Broe, A. Grow
6/9	Quiz 2	———
6/13	Chapter 19 — Group Theory	C. Grow, Khaitan
6/14	Chapter 20 — Hypercomplex Numbers	James, Jansrang
6/15	Chapter 21 — Algebraic Number Theory	Domagalski, Vasquez
6/16	Chapter 22 — Topology	Alyousef, A. Grow
6/20	Chapter 23 — Simple Groups	Broe, Khaitan
6/21	Chapter 24 — Sets, Logic, and Computation	C. Grow, Jansrang
6/22	Chapter 25 — Combinatorics	Salisbury
6/23	Final Exam	———

Additional Notes

- CMU provides students with disabilities reasonable accommodation to participate in educational programs, activities, or services. Students with disabilities requiring accommodation to participate in class activities or meet course requirements should first register with the office of Student Disability Services (120 Park Library, telephone: 989-774-3018, TDD 989-774-2568), and then contact me as soon as possible.