

History of Mathematics
MAT 4930
Spring 2025

Classroom: LIT219

Meeting Times: MWF6

Instructor: Konstantina Christododoulou

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Office Location: LIT 365

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Office Hours: M7, W8, F4, and by appointment.

Open Door Policy: You are welcome to drop by to discuss any aspect of the course, anytime.

All course materials will be posted in e-Learning Canvas

All course materials will be posted in eLearning Canvas, <http://elearning.ufl.edu/>.

Text: *Mathematics and Its History*, by John Stillwell. The book is available online through the UF Marston Science Library. We will cover topics from Chapters 1-14, plus additional material, time permitting. Additional readings will be available in Canvas or accessible online through the UF libraries. In addition, we will use the following online resource (browse to become familiar with the many biographies and mathematics topics available at this website): The MacTutor History of Mathematics Archives (University of St Andrews)

Prerequisites: MHF3202 with a minimum grade of C.

Course Content and Objectives: The goal of the course is to expose students to the historical development of mathematical ideas, over time and across cultures, and to acquaint them with some of the basic techniques, as they were historically developed. We will emphasize primarily the mathematics that influenced the development of algebra, geometry, and calculus, and we will look into selected topics from modern mathematics. This course will also allow students to examine the importance of cultural interactions in mathematical history and develop a cohesive picture of mathematics.

Student Learning Outcomes: At the end of this course, students will be able to:

- Analyze and discuss the development of various mathematical concepts (e.g. geometry, number theory, analysis, and algebra) through history and various civilizations
- Identify important concepts from the history of mathematics and discuss historical arguments for their validity.
- Identify the influences of culture, philosophy and science on mathematics
- Identify and evaluate the role and purpose of proof in mathematics.
- Communicate historical concepts in mathematics using appropriate terminology and notation in written and oral form.

Course Web Page: All course materials and assignments will be posted in Canvas; all grades will be posted in the Canvas grade book. You are responsible for verifying that those grades are accurate. **You**

have one week after a score has been posted to contact me to resolve any grade concerns. We will not consider any grading disputes nor make any grade adjustments at the end of the semester.

Please review the UF Resources and Policies for available technical assistance, resources and UF policies.

Grading:

| | |
|---|-----|
| Problem Sets & In-class Activities | 25% |
| Midterm Exam | 30% |
| Presentation | 10% |
| Term Paper Proposal | 5% |
| Term Paper Draft Submission & Peer Review | 5% |
| Term Paper | 25% |

The following grading scale applies.

| | | | |
|----|-------------|----|-------------|
| A | $\geq 90\%$ | C | $\geq 70\%$ |
| A- | $\geq 87\%$ | C- | $\geq 67\%$ |
| B+ | $\geq 84\%$ | D+ | $\geq 64\%$ |
| B | $\geq 80\%$ | D | $\geq 60\%$ |
| B- | $\geq 77\%$ | D- | $\geq 56\%$ |
| C+ | $\geq 74\%$ | E | $< 56\%$ |

The current UF grading policies for assigning grade points is available here: <https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/>

Grades will not be rounded and extra assignments for individual students to improve a grade are NOT possible. We will not review disputed points at the end of the semester. All grade concerns must be settled within one week of the posting of the grade.

Problem Sets & In-Class Activities: Problem sets will be assigned regularly in Canvas. I expect all solutions to be written in full sentences and to be grammatically correct. In-class Activities will consist of questions on advanced reading assignments and warm-up exercises to discuss and/or present in class. You are expected to participate in class discussions and activities. Therefore, *it is absolutely essential that you attend class*. Participation during class is crucial and it constitutes an important avenue for learning. I encourage you to be active in every class session. In-class discussions and/or activities will be assigned throughout the course. These activities are meant to encourage attendance and allow for brief reflection on the week's material. Make-ups will be granted only for excused absences consistent with university policies in the undergraduate catalog <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx> and require appropriate documentation.

Midterm Exam: The midterm exam is scheduled for Friday, March 7; the exam will be in-person during our regular class and it will contain a mixture of mathematical exercises and short answer historical

questions. **The exam cannot be rescheduled unless you meet the University requirements; see <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>.** Absolutely no collaboration on the exam is allowed.

Grading Rubric: All mathematical solutions will be graded using the following rubric:

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|---|---|
| 5 | Correct mathematical solution and very well written. |
| 4 | Small errors such as incomplete sentences, abbreviating words, imprecise definitions, or overlooking trivial cases. |
| 3 | Contains an outline of a correct solution and several steps toward this solution, but the writing is unclear or there are gaps in the solution. |
| 2 | Some original steps toward a correct solution but with significant mathematical errors. |
| 1 | No original steps toward a correct solution. |

Term Paper: You will choose a mathematical topic to research and complete a paper. The paper should be of length 8-12 pages (without cover sheet or references) typeset using LaTeX (12pt). A LaTeX template will be provided to ensure consistency. The main requirement is that your paper must involve a "great idea" or a "great theorem" of mathematics, so it should be about mathematics. The other main requirements are that you should be able to provide a well-supported argument justifying this choice of topic in your topic proposal and discuss the mathematics in your paper with some genuine understanding of it. All papers are expected to be well-written, free from grammatical errors, and have excellent mathematical depth and style. More details and a grading rubric will be provided in Canvas early in the semester.

- You should direct a significant portion of your paper toward a general university audience and articulate clearly which sections are aimed toward experts.
- You will turn in a first draft of your paper for peer review; the draft must be a complete paper that you will revise to create your final paper submission.

Presentation: Towards the end of the semester, you will give a short presentation of your paper to the whole class. Presentations will be 10-15 minutes and will be evaluated on mathematical content, style, clarity, and organization. Students are expected to attend all presentations. Guidelines and a grading rubric will be provided in Canvas.

Note: I understand that we all have different levels of comfort regarding speaking in class. If you have any issues that prohibit you from participating in class, I encourage you to contact me as early as possible so we can find ways to make participation work for you in this class.

Submitted work expectations: Submitted assignments should be neat, organized, and clearly presented. Submissions not meeting these standards may have the scores reduced or may be returned ungraded.

Excused absences are consistent with university policies in the undergraduate catalog <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx> and require appropriate documentation.

Make-up policies: Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at: <https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>

Make-up assignments will be allowed in the following cases:

- In case of illness, upon receipt of a medical excuse note or equivalent, or by following the procedure outlined here: <https://care.dso.ufl.edu/instructor-notifications>.
- In case of religious holidays, by informing me via e-mail ahead of time.
- In case of military duty, jury duty, participation in academic conferences, or participation in official university or UAA events, by providing appropriate evidence ahead of time.
- In case of family emergencies or other extenuating circumstances, by following the procedure outlined here: <https://care.dso.ufl.edu/instructor-notifications>.

In all other cases, or if you are unsure, please email me as soon as feasible. Absences are generally not excused for non-emergency travel and personal schedule conflicts. Students are still responsible for submitting assignments on time unless an extension has been requested via email and approved by the instructor prior to the deadline. In case of true documented emergencies, the instructor will waive this requirement.

Technical difficulties are not generally an excuse for missing an assessment or assignment; students should have contingency plans in case any such issues arise.

Incomplete: A student who has completed a major portion of the course with a passing grade but is unable to complete the final exam or other course requirements due to illness or emergency may be granted an incomplete, indicated by a grade of "I". This allows the student to complete the course within the first six weeks of the following semester. You must contact me before the final exam to sign an incomplete grade contract (<https://math.ufl.edu/wp-content/uploads/sites/124/incomplete-grade-contract.pdf>) and you must provide documentation of the extenuating circumstances preventing you from taking the final exam. The grade of "I" is never used to avoid an undesirable grade, and does not allow a student to redo work already graded or to retake the course. See the official policy at <http://www.math.ufl.edu/department/incomplete-grades/>.

Students with Disabilities: Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the Disability Resource Center. Click here to get started with the Disability Resource Center. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

Academic Honesty: UF students are bound by The Honor Pledge which states "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. " On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Conduct Code specifies a number of behaviors that are in violation of this code and the possible sanctions. See the UF Conduct Code website for more information. If you have any questions or concerns, please consult with the instructor.

Online Course Evaluation: Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals.

Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students here: <https://gatorevals.aa.ufl.edu/public-results/>.

Campus Resources:

Health and Wellness

U Matter, We Care: If you or someone you know is in distress, please contact umatter@ufl.edu, 352-392-1575, or visit <https://umatter.ufl.edu/> to refer or report a concern and a team member will reach out to the student in distress.

Counseling and Wellness Center: Visit <https://counseling.ufl.edu/> or call 352-392-1575 for information on crisis services as well as non-crisis services.

Student Health Care Center: Call 352-392-1161 for 24/7 information to help you find the care you need, or visit <https://shcc.ufl.edu/>.

Academic Resources

E-learning technical support: Contact the UF Computing Help Desk at 352-392-4357 or via e-mail at helpdesk@ufl.edu.

Career Connections Center: Reitz Union Suite 1300, 352-392-1601. Career assistance and counseling services.

Library Support: Various ways to receive assistance with respect to using the libraries or finding resources.

MAT 4930 History of Mathematics Calendar

The actual pace of the course may be slightly different than listed in the syllabus below. It will depend on the students' response to the material. **Homework and readings will be assigned regularly.** Handouts, Lecture Notes, etc. are posted in Canvas. Below we will denote by: Stillwell = Mathematics and Its History (can be accessed through UF's library), MTM = [The MacTutor History of Mathematics Archives](#), and The History of Mathematics: A Source-Based Approach by Barrow-Green, Gray & Wilson=BGW. All readings will be accessible online through the UF Library and/or in Canvas. **Please check Canvas regularly for updates.**

| | Topics | Readings/Assignments |
|----------------|--|--|
| Week 1 | Ancient Arithmetic Egyptian Mathematics Babylonian Mathematics | MTM: Overview of the history of mathematics BGW Chapter 2 |
| Week 2 | Greek Mathematics Overview: Plato and Aristotle Euclid's Elements, The Pythagorean Theorem, Irrational Numbers | BGW: Chapter 3, Stillwell: Chapter 1 Homework |
| Week 3 | Ruler and Compass Constructions, Polygonal, Prime, and Perfect Numbers, the Euclidean Algorithm, Pell's Equation | BGW: Chapter 4, Stillwell: Chapters 2-3 Homework |
| Week 4 | Infinity in Greek Mathematics, Archimedes, Ptolemy and Astronomy, Diophantus | Stillwell: Chapter 4, BGW: 6.3 & 6.4 Homework |
| Week 5 | Mathematics in India and China | BGW: Chapter 7, Stillwell: Chapter 5, 6.1-6.3, 11.1 Homework |
| Week 6 | Mathematics in the Islamic World, the Mathematical Awaking of Europe. | BGW: Chapters 8 & 9 Term Paper Proposal Due |
| Week 7 | Cubics and Quartics in 16th-century Italy, Bombelli and Viete, the Renaissance. | Stillwell: 6.5-6.8, 14.1-14.4 MTM: Cardano, Tartaglia, Abel, Galois Homework |
| Week 8 | European Mathematics in the Early 17 th -century Calculus | Stillwell: Chapter 9, BGW: 13.1-13.3 MTM: Wallis, Fermat, Descartes, Newton, Leibniz |
| Week 9 | Infinite Series Midterm Exam | Stillwell: 10.1, 10.2, 10.4, 10.8 MTM: Euler Homework |
| Week 10 | Spring Break/No Class | |
| Week 11 | The Number Theory Revival | Stillwell: Chapter 11 Homework Draft Version of Term-Paper Due |
| Week 12 | Non-Euclidean Geometry The Rigorization of Calculus | Stillwell Chapter 18 Who Gave you the Epsilon? And Other Tales of Mathematical History, edited by Marlow Anderson, et al., American Mathematical Society, 2009, pp. 5-14, available online through UF's Library. Homework |
| Week 13 | Hypercomplex Numbers C | Stillwell: Chapter 20 Homework Peer Review Due |
| Week 14 | Sets, Logic, and Computations Class (time permitting)/Presentations | Stillwell: Chapter 24 |
| Week 15 | Class Presentations | Paper due |