MATH 390-01: HISTORY OF MATHEMATICS (3 cr.)

SYLLABUS & COURSE POLICIES

DORDT UNIVERSITY

FALL 2023

Instructor:	Dr. Mike Janssen, Professor of Mathematics
Email:	`Mike.Janssen@dordt.edu`; I will endeavor to reply to every email within one school day.
Classroom:	CL 1303
Class time:	10:00–10:50 AM MWF
Office:	SB 1612
Office Phone:	(712) 722-6398
Student Hours:	By appointment: `https://fantastical.app/mkjanssen/student-hours`

Catalog course description: A survey of the history of mathematics from ancient times into the 20th century, in cultural context, with attention given to how the philosophy of mathematics relates to the development of mathematics. Prerequisite: grade of C– or higher in Mathematics 152; or permission of instructor.

REQUIRED RESOURCES

- *A History of Mathematics*, 3rd ed., by Victor J. Katz
- *What is Mathematics, Really?*, by Reuben Hersch
- *Mathematics Through the Eyes of Faith*, by Bradley and Howell (eds.)
- Regular access to Canvas

LEARNING OBJECTIVES

In this course, we will focus on becoming COMMUNICATORS of and AMBASSADORS for mathematics. In particular, we will:

grow in awareness of the human role in the development of mathematics. (CD)

describe key figures and events in the history of mathematics. (CD)

study major philosophies of mathematics. (RO)

articulate a personal philosophy of mathematics. (CD, CR)

complete a major research paper on a particular historical development in mathematics. (CD)

COURSE LITURGIES

We will use Katz as our primary guide through the history of math. On a few Fridays we will take some time to discuss the philosophy of mathematics in greater depth and make specific connections to the Reformed Christian faith. A more detailed (tentative) schedule can be found below.

HOMEWORK

Homework will consist of a mix of historical mathematics problems and short essay questions about recent material, and will be assigned every 2-3 weeks. Your responses should be typed (preferably in LaTeX) and submitted on Canvas. They will be due on: September 6, 20; October 4, 18; November 8, 29.

PHILOSOPHY JOURNALS

On September 15, October 4, October 27, and November 17, we will discuss a selection of readings about the philosophy of mathematics in class. Readings will consist of a mixture of chapters from Hersch, *MTEF*, and handouts posted to Canvas. Prior to each of those classes, a reading journal (3-4 pages) will be due. These should be used to develop your PERSONAL PHILOSOPHY OF MATHEMATICS.

HISTORICAL TERM PAPER

One of the major works of the semester will be a research paper on a particular topic in the history of mathematics and/or statistics. The final draft will be due on Friday, November 3. Your topic should be selected by the end of September. A rubric will be available by mid-September.

PERSONAL PHILOSOPHY OF MATHEMATICS ASSIGNMENT

Through various readings and discussions we will consider different perspectives on some of the big questions of the philosophy of mathematics, including:

- What *is* mathematics? (Ontology)
- What is truth? How can we know mathematical truths? (Epistemology)
- What does it mean to *do* mathematics? Why should Christians (or anyone!) be concerned with mathematical questions? (Teleology)
- Why is mathematics *effective* in describing the physical Creation?
- What is beauty? What does it mean to say that mathematics is beautiful? (Aesthetics)
- What is chance, and how can we reconcile its seeming existence with God's sovereignty?

Through the readings and the journals, you will begin to articulate your own answers to these questions in the form of a PERSONAL PHILOSOPHY OF MATHEMATICS. At the end of the semester, you'll articulate and share this philosophy with the class in the form of an essay or other equivalent work (e.g., video, podcast, etc.).

NOTE ON THE USE OF GENERATIVE AI

Contrary to other math courses, this course includes a lot of writing (see above!). At NO POINT should you use generative AI tools for work related to this class (including, but not limited to, ChatGPT). The use of such tools for work in this class constitutes plagiarism and will be reported to the Student Life Committee.

GRADING POLICY

Course assignments will be weighted as shown in Table 1.

Activity	Weight
Homework	20%
Historical Term Paper	15%
Reading Journals	25%
Philosophy Assignment	25%
Final	15%

Table 1: Assignment weights.

Your final percentage, G, will be assigned a letter grade as shown in Table 2.

Grade	Interval
A	$95\% \leqslant G \leqslant 100\%$
A–	$90\% \leqslant G < 95\%$
B+	$87\% \leqslant G < 90\%$
B	$83\% \leqslant G < 87\%$
B–	$80\% \leqslant G < 83\%$
C+	$77\% \leqslant G < 80\%$
C	$73\% \leqslant G < 77\%$
C–	$70\% \leqslant G < 73\%$
D+	$67\% \leqslant G < 70\%$
D	$60\% \leqslant G < 67\%$

Table 2: Final grade cutoffs.

OTHER POLICIES AND ADVICE

I am generally fairly accepting of late work, with a built-in 24-hour grace period for any non-classroom activities. Additional time beyond the 24-hour grace period must be approved ahead of time.

Student hours are your time to ask questions about all aspects of the class and college life. Please check online for an appointment. If you can't find one, send me an email! I will do my very best to accommodate your you.

Email Policy: I check my email twice per school day: once in the morning, where I'll deal with any emergencies, and once in the afternoon, when I'll respond to other emails (including any that have come in since the morning). If you require a more immediate response, you're welcome to come find me in my office.

INSTITUTIONAL POLICIES

DORDT UNIVERSITY STUDENT'S RIGHT TO ACCOMODATIONS POLICY

Dordt University is committed to providing reasonable accommodations for students with documented qualifying disabilities in accordance with federal laws and university policy. Any student who needs access to accommodations based on the impact of a documented disability should contact the Coordinator for Service for Students with Disabilities: Sharon Rosenboom, Academic Enrichment Center, 712 (722-6490), Email: Sharon.Rosenboom@dordt.edu.

DORDT UNIVERSITY ACADEMIC HONESTY POLICY

Dordt University is committed to developing a community of Christian scholars where all members accept the responsibility of practicing personal and academic integrity in obedience to biblical teaching. For students, this means not lying, cheating, or stealing others' work to gain academic advantage; it also means opposing academic dishonesty. Students found to be academically dishonest will receive academic sanctions from their professor (from a failing grade on the particular academic task to a failing grade in the course) and will be reported to the Student Life Committee for possible institutional sanctions (from a warning to dismissal from the college).

Dordt University continues to monitor developments in the use of AI. For the Fall 2023 semester, follow your instructor's AI-related policies and procedures.

Appeals in such matters will be handled by the student disciplinary process. For more information, see the Student Handbook at https://www.dordt.edu/student-life/residential-life/student-services/student-handbook.

DORDT UNIVERSITY ATTENDANCE POLICY

As we begin the 2023-2024 school year, class attendance policies and procedures as outlined in the Student Handbook are in place. To paraphrase the Student Handbook, Dordt University as an institution remains committed to in person instruction for face-to-face courses. As a result, you are expected to be present for every class period and laboratory period. Should you need to miss class for any reason, contact your instructor as soon as possible (either prior to the absence or immediately following). Absences for Dordt-sponsored curricular or co-curricular activities will be communicated by the activity sponsor and are considered excused.

You are responsible to contact your instructor to make arrangements for missed work. Your instructor is not required to provide real time (synchronous) learning for you should you be absent for class for any reason (ex. Zooming into your real time class). Your instructor is also not required to provide asynchronous virtual learning materials for you (ex. recordings of missed classes, powerpoints, other materials on Canvas). While some instructors might utilize some of the synchronous/asynchronous methods of making up work on occasion, you should not expect all instructors to provide these experiences automatically. Methods of making up missed work might include: contacting a fellow student to get notes from class, extensions on assignments or labs, or other methods as determined by your instructor. Making arrangements for missed class work is your responsibility!

Please see your instructor's specific attendance policy.

I reserve the right to make changes to this document as the need arises.

Tentative Schedule

Date		Lecture #	Daily Plan	Readings	Other Work Due
Aug. 30	W	1	HoM in a Large Nutshell		
Sept. 1	F	2	Egyptian Math	Katz 1–10	
Sept. 4	M	3	Mesopotamian Math	Katz 10–26	
Sept. 6	W	3	Mesopotamian Math	Katz 10–26	Homework 1
Sept. 8	F	4	Pre-Euclidean Math	Katz 33–47	
Sept. 11	M	5	Greek Philosophy of Math I	Katz 36–41	
Sept. 13	W	5	Greek Philosophy of Math II	Hersch, 91–106	
Sept. 15	F		Philosophy I	MTEF, 1–36; Hersch, Dialogue with Laura and pp. 3–34	Phil. Journal 1
Sept. 18	M	6	Euclid	Katz 51–65	
Sept. 20	W	6	Euclid	Katz 66–89	Homework 2
Sept. 22	F	7	Archimedes; Greek conics and trig	Katz 95–125 (skim)	
Sept. 25	M	8	Late Greek Math	Katz 173–190	
Sept. 27	W	9	Chinese Arithmetic and Linear Algebra	Katz 196–226	
Sept. 29	F	10	Indian Arithmetic and Algebra	Katz 231–260	
Oct. 2	M	11	Arabic Arithmetic and Algebra: al-Khwarizmi	Katz 267–292	
Oct. 4	W		No class: Dr. Janssen out of town		
Oct. 6	F		No class: Heartland		
Oct. 9	M		Philosophy II	Hersch, 35–90; MTEF Ch.3–5	Phil. Journal 2, Homework 3
Oct. 11	W	12	Medieval Arithmetic and Algebra: Fibonacci	Katz 292–318	
Oct. 13	F	13	16th Century Algebra: Fibonacci and Jordanus/Developments in Algebra	Katz 325–358; 383–404	
Oct. 16	M	14	Developments in Algebra: Bombelli, Viete	Katz 404–417	Term Paper Annotated Bib.
Oct. 18	W	15	Developments in Algebra: Descartes	Katz 468–487	
Oct. 20	F	16	Calculus: Beginnings	Katz 508–538	Homework 4
Oct. 23	M	17	Calculus: Newton	Katz 544–565	
Oct. 25	W	18	Calculus: Leibniz	Katz 565–578	
Oct. 27	F		Philosophy III	MTEF Chs. 6–8; Hersch Ch. 7	Phil. Journal 3
Oct. 30	M	19	Foundations of Calculus	Katz 583–584, 594 (Euler bio), 611–636	
Nov. 1	W	20	Probability	Katz 643–661	
Nov. 3	F	21	Geometry and the Parallel Postulate	Katz 687–705	Historical Term Paper
Nov. 6	M	22	Modern Algebra	Katz 724–758	
Nov. 8	W	23	Non-Euclidean Geometry	Katz 839–866	Homework 5
Nov. 10	F	24	Axioms and Set Theory	Katz 867–870, 876–882	
Nov. 13	M	25	Logic and Logicism		
Nov. 15	W	26	Foundations and Model Theory		Personal PoM First Draft
Nov. 17	F		Philosophy IV	MTEF Chs. 9–11; Hersch Chs. 8–9	Phil. Journal 4
Nov. 20	M	27	Statistics and Computation	Katz 903–919	
Nov. 22–27			Thanksgiving Break		
Nov. 29	W	28	Recent Developments in Mathematics	Katz 919–925	Homework 6
Dec. 1	F	28	Recent Developments in Mathematics		
Dec. 4	M	29	Women in Math		
Dec. 6	W	29	Women in Math		
Dec. 8	F		Christian HoM/PoM Discussion and Presentation	Jongsma and Vander Meulen	
Dec. 11	M		Christian HoM/PoM Discussion and presentation		
Dec. 13	W	30	Math at Dordt/Christian HoM/PoM Discussion and presentation		
Dec. 18	M		3:30pm: Final Discussion		Personal PoM final draft