## Course Readings

We have unlimited access to some of the texts listed below (whether because of their copyright status or the fact that the university library system gives us free and unlimited access). These will either be uploaded to the Canvas course page (under "Files") or available online through the library catalog. Other texts we will use in a limited way in accordance with established Fair Use guidelines, and these portions can be found uploaded to the Canvas course page (again under "Files").

- Stedall, Jacqueline, *The History of Mathematics: A Very Short Introduction*, Oxford University Press, 2012. (Required purchase. You will read this book early in the course to help give you a sense of the breadth of questions you might ask about the history of mathematics. It is in no sense a "course textbook.")
- (2) Stedall, Jacqueline, Mathematics Emerging, Oxford University Press, 2008.
- (3) Euclid, *Elements*, edition available at https://mathcs.clarku.edu/~djoyce/java/ elements/elements.html.
- (4) Robson, Eleanor, "Words and Pictures: New Light on Plimpton 322," American Mathematical Monthly vol. 109, pg. 105-120.
- (5) Cullen, Christopher, "Astronomy and mathematics in ancient China," Cambridge University Press, 1996.
- (6) Plato, *Republic*, trans. Waterfield, Oxford University Press, 1994.
- (7) "Plato: *The Republic*," by Antonis Comondouros, *The Internet Encyclopedia of Philosophy*, https://www.iep.utm.edu/republic/ (as of August 14, 2019)
- (8) Plato, Timaeus, trans. Waterfield and Gregory, Oxford University Press, 2008.
- (9) Plutarch, Lives of the noble Grecians and Romans, trans. Clough. Project Gutenberg e-text.
- (10) Aristotle, *Prior Analytics*, trans. by Jenkinson, available at https://ebooks.adelaide.edu.au/a/aristotle/a8pra/contents.html.
- (11) Hilbert, David, Foundations of Geometry, translated by Townsend, Open Court Publishing Company, 1902, available at https://math.berkeley.edu/~wodzicki/160/Hilbert. pdf.
- (12) Courant, Richard and Robbins, Herbert, *What is Mathematics*, 2nd edition revised by Ian Stewart, Oxford University Press, 1996.
- (13) Katz, Victor (ed.); with contributions by Imhausen, Annette; Robson, Eleanor; Dauben, Joseph; Plofker, Kim; and Berggren, Lennart, *The Mathematics of Egypt, Mesopotamia, China, India, and Islam, a Sourcebook*, Princeton University Press, 2007.
- (14) Katz, Victor, A History of Mathematics: An Introduction, 3rd edition, Addison-Wesley, 2009.
- (15) Libbrecht, Ulrich, Chinese Mathematics in the Thirteenth Century, MIT Press, 1973.
- (16) Shen, Kangshen; Crossley, John; and Lun, Anthony, *The Nine Chapters on the Mathematical Art*, Oxford University Press, 2000.
- (17) Martzloff, Jean-Claude, A History of Chinese Mathematics, Springer, 2006.
- (18) Tegmark, Max, "The Mathematical Universe," *Foundations of Physics* 38:101-150, 2008, available at https://arxiv.org/pdf/0704.0646.pdf
- (19) Heath, Thomas, (Archimedes), *The Works of Archimedes*, available at https://archive.org/details/worksofarchimede029517mbp/page/n4.
- (20) Heath, Thomas, (Archimedes), *The Method of Archimedes*, available at https://archive.org/details/cu31924005730563/page/n6.

- (21) Netz, Reviel, (Archimedes, Eutocius), *The works of Archimedes, Volume I: The Two Books* on the Sphere and Cylinder, Cambridge University Press, 2004.
- (22) Coxeter, H.S.M., Introduction to Geometry, 2nd edition, John Wiley & Sons, 1969.
- (23) Netz, Reviel and Noel, William, The Archimedes Codex, Da Capo Press, 2007.
- (24) Gutas, Dimitri, Greek Thought, Arabic Culture: the Graeco-Arabic Translation Movement in Baghdad and Early Abbasaid Society, Routledge 2012.
- (25) Katz, Victor; Folkerts, Menso; Hughes, Barnabas; Wagner, Roi; Berggren, J.L., *Source-book in the Mathematics of Medieval Europe and North Africa*, Princeton University Press, 2016.
- (26) Hodgkin, Luke, A History of Mathematics: From Mesopotamia to Modernity, Oxford University Press, 2005.
- (27) Alberti, On Painting, trans. Sinisgalli, Rocco, Cambridge University Press, 2011.
- (28) Descartes, René, A Discourse on the Method: Of Correctly Conducting One's Reason and Seeking Truth in the Sciences, trans. Maclean, Oxford University Press, 2006.
- (29) Descartes, René, *The Geometry of Rene Descartes, with a facsimile of the first edition*, trans. Smith, David and Latham, Marcia, Dover, 1954.
- (30) Stanford Encyclopedia of Philosophy, "Newton's *Philosophiae Naturalis Principia Mathematica*," https://plato.stanford.edu/entries/newton-principia/#SciAchPri.
- (31) Newton, Isaac; Cohen, Whitman, Budenz, *The Principia: The Authoritative Translation: Mathematical Principles of Natural Philosophy*, Berkeley: University of California Press, 2016.
- (32) Brackenridge, J. Bruce, *The Key to Newton's Dynamics: The Kepler Problem and the Principia*, University of California Press, 1995.
- (33) Stillwell, John, *Elements of Mathematics: from Euclid to Gödel*, Princeton University Press, 2016.
- (34) Hofstadter, Douglas, Gödel, Escher, Bach: an Eternal Golden Braid, Basic Books, 1999.
- (35) Poincaré, Henri, *The Foundations of Science*, trans. by Halsted, The Science Press, 1913. (Available on Google Books.)
- (36) Spivak, Michael, *A Comprehensive Introduction to Differential Geometry*, Volume II, 3nd ed., Publish or Perish, 1999.

Day	Reading Due	Lecture	Due
М	Read the syllabus!	Quadratic Equations: Babylonian. Euclid	none
8/19 1		II.P11. al-Khwarizmi	
W	$ME^1$ 1.1.1, 1.4.	"Pythagorean" Theorem: Plimpton 322.	none
8/21 2	Robson 105-109	Diophantus II.8	
	(optional: read the		
	rest of the article).		
	ME 1.3.3. $VSI^2$ Chpt.		
	1, 3		
F 8/23	VSI Chpt. 2, 6.	Pythagoras. Euclid I.47. Gou-gu theorem	none
3	Cullen xi-6, 77-83,	and the Zhou bi.	
	171, 206-210		
М	IEP Republic Intro,	Mathematics in ancient Greece: Plato's	none
8/26 4	synopses of Books 6-	philosophical propaganda for "pure" math-	
	7. <sup>3</sup> Plato <i>Republic</i>	ematics; the historically singular attention to	
	509d-532d. <sup>4</sup> Plutarch	deductive proof. Aristotle's logic. Introduc-	
	285-288. <sup>5</sup> Aristo-	tion to the <i>Elements</i> .	
	tle PrA I.1-4, I.23. <sup>6</sup>		
	WiM <sup>7</sup> 58-60		
W	Euclid <sup>8</sup> I up through	Discussion of Euclid I (application of the	none
8/28 5	I.P5, I.P13, I.P29,	various axioms) and Euclid II (the "geomet-	
	I.P32, II.P1-6, II.P11.	ric algebra" debate). Magnitude and Number	
		and introduction to ratio (V).	
F 8/30	Euclid V.D1-6;	Euclid's algorithm (VII, X). Applications of	none
6	VII.P1-2; IX.20;	iterated division with remainder: incommen-	
	X.D1; X.P1-3. Read	surability (pentagon). (Continued fractions.)	
	the statements of	Introduction to congruence and the "pulver-	
	X.P4-X.P9. <sup>9</sup> WiM	izer" in India.	
	pgs. 42-46, 49-50.		

<sup>1</sup>"ME" is Stedall, *Mathematics Emerging* 

<sup>2</sup>"VSI" is Stedall, The History of Mathematics: A Very Short Introduction

<sup>3</sup>"IEP *Republic*" refers to the Internet Encyclopedia of Philosophy article on *The Republic*.

<sup>4</sup>Plato references are done in the Stephanus page system: any modern edition, regardless of its own page numbering, will print in the margins Stephanus page references (e.g. 509d) that refer to those in a 16<sup>th</sup>-century edition; this makes references clear even between translations and editions.

<sup>5</sup>The Plutarch page references are to the actual pages of the pdf file. Thus you should read from "He [Marcellus] now was a third time created consul ..." until the death of Archimedes. (We will come to Archimedes later: what you should be looking for here is the Platonic influence on Plutarch's picture of the Greek mathematicians.)

<sup>6</sup>This reading is an introduction to Aristotle's theory of the syllogism in the *Prior Analytics*; try to get the gist of the first few sections, and then in I.23 focus on the last paragraph, where he exemplifies *reductio ad impossibile* ("reduction to the impossible," i.e., proof by contradiction with reference to the proof of what we would now call irrationality of  $\sqrt{2}$ .)

<sup>7</sup>"WiM" is Courant-Robbins, *What is Mathematics?* 

<sup>8</sup>Euclid references are to the book (a Roman numeral) and then a specific list of Propositions (P) or Definitions (D)

<sup>9</sup>If you want to appreciate the force of the distinction between number and magnitude, and how Euclid must work to connect the notions of ratio for each, I highly recommend trying to understand the proof of X.P9.

Day	Reading Due	Lecture	Due
M 9/2	none	no class: Labor Day	none
W 9/4	Katz 244-250. <sup>10</sup> VSI	Congruence. India: the pulverizer and the	PSet1
7	Chpt. 4-5. WiM 31-	chakravala. Modern solutions to "Pell's	
	<u>36.</u>	equation."	
F 9/6 8	Hodgkin 78-82, 85-	Finish chakravala. Sun-Zi, Qin Jiushao, and	none
	88. Libbrecht 55-65.	the general Chinese Remainder Theorem.	
		Describer as helt a large Freed'd VIII Dista ?; ?;	
M 9/9	SKIIII Euclid VIII D12 and Dista	Regular polynedra: Euclid AIII. Plato S In-	none
9	Timagus 27d-30c	al Universe "	
	51c-56c Tegmark	car oniverse.	
	sections I-II. WiM		
	236-240.		
W	Euclid X.P1 (review),	The method of exhaustion: Euclid XII. Vol-	PSet 2
9/11	XII.P2.	ume of sphere.	
10			
F 9/13	Euclid XII.P18.	Canonical texts in the Chinese mathematical	none
11	Hodgkin 82-84. <sup>11</sup>	tradition. The Nine Chapters. Volume of the	
	Nine Chapters (SCL)	sphere in the Chinese tradition: Liu Hui and	
	1-17.12 Sourcebook <sup>13</sup>	Zu Geng	
	230-239.		<b>XX7A 1</b>
M 0/16	Nine Chapters (SCL)	Nine Chapters, continued: the Array Rule,	WAI
9/10	17-22, Waltzioli 221- 226 Hodgkin 88-00	numerical extraction of foots.	
W	The Archimedes	Intro to the works of Archimedes Review of	none
9/18	Codex 27-64. <sup>14</sup>	conic sections. The Palimpsest.	none
13	Archimedes $(Netz)^{15}$ ,	come sections. The Lemmpscon	
_	pgs. 1-18.		
F 9/20	Archimedes QP	Archimedes: quadrature of parabolas: proof	none
14	(Heath) Introduction	by exhaustion and by law of the lever using	
	letter, Prop 1-4,	"the method."	
	18-24 <sup>16</sup> . Archimedes		
	(Heath) Method In-		
	troductory letter. The		
	Archimedes Codex		
	139-137 (Chpt 6)		

<sup>&</sup>lt;sup>10</sup>"Katz" refers to Katz, A History of Mathematics. If any topic in this course particularly interests you, I highly recommend you look up the bibliography/chapter end notes in the relevant chapter of Katz. These are great startingpoints for research for a paper. <sup>11</sup>Note there is a typo: the "divisor" is 16 + 11 = 27.

<sup>&</sup>lt;sup>12</sup>This refers to the Shen-Crossley-Lun reading. You needn't pay too much attention to the section on metrological systems, but there are a couple of interesting points there, for instance the evidence for dating the Nine Chapters by the length measurement units that are used (or not) in the text.

<sup>&</sup>lt;sup>13</sup>"Sourcebook" refers to Katz et al., *The Mathematics of Egypt, Mesopotamia, China, India, and Islam: A Sourcebook* <sup>14</sup>The first chapter is great fun, and I strongly recommend reading it as well. Some of the claims in chapter 2 should be taken with a grain of salt. Contrast Netz's "popular" style in this book to his "scholarly" style in the *Sphere and Cylinder* translation and commentary.

<sup>&</sup>lt;sup>15</sup>Archimedes (Netz) refers to Netz's translation and commentary, *The works of Archimedes, Volume I: the Two Books on the Sphere and Cylinder*. Archimedes QP (Heath) refers to Heath's paraphrase of Archimedes' *Quadrature of Parabolas* and Archimedes Method (Heath) refers to Heath's paraphrase of Archimedes' *Method* (these two texts are both uploaded to Canvas in their entireties. Note that what Heath produced is not properly a "translation," hence the description "paraphrase": he follows Archimedes' text closely but often recasts it in more modern mathematical phrasing. Shockingly, aside from Netz's work (which is ongoing) there is not yet a rigorous English translation of any of the works of Archimedes.

<sup>&</sup>lt;sup>16</sup>See previous footnote. In the Heath editions of Archimedes, I give references to Propositions, not page numbers; thus this assignment asks you to read Archimedes' introductory letter (to Conon) and Propositions 1-4, 18-24 of *Quadrature of Parabolas*. Note that some of these are simply results he cites without proof from an earlier "elements" of conics. We will review conic sections in class on Wednesday, but if you want to refresh a little more, you could look at Coxeter §8.4.

Day	Reading Due	Lecture	Due
М	Archimedes (Heath),	Archimedes: surface area of a sphere. Area	none
9/23	SC 23-25, 33.	of a cylindrical segment. "Mathematics is	
15	Archimedes (Netz),	the science of the infinite," take 1.	
	pgs. 144-148 (SC		
	33). The Archimedes		
	Codex 183-204 (Chpt		
	8)		
W	Sourcebook 515-524,	New directions in the classical tradition: in-	PSet 3
9/25	572-573, <sup>17</sup> Gutas 1-7,	tro to the mathematics of the medieval Arab-	
16	11-20, 28-34. <sup>18</sup>	Islamic world.	
F 9/27	Sourcebook 542-546,	Islamic arithmetic and algebra: al-	none
17	525-526. Hodgkin	Khwarizmi, Thabit ibn Qurra, Abu Kamil.	
	5.1-5.6		
М	Sourcebok 537-542.	Advanced algebra and arithmetic: al-Karaji,	WA2
9/30	Hodgkin 5.7	al-Samawal, al-Kashi.	
18			
W	Sourcebook 556-560,	Advanced Islamic geometry and algebra: ibn	none
10/2	587-595.	al-Haytham and the paraboloid. Start dis-	
19		cussing al-Khayyam's algebra	
F 10/4	Sourcebook 607-609.	Finish Khayyam's cubics. Nasir din al-Tusi	PSet 4
20		and the parallel postulate.	
Μ	Fall break	Note upcoming assignments! Midterm and	none
10/7		paper proposal	
W	Fall break	none	none
10/9			
F	Fall break	none	none
10/11			

<sup>&</sup>lt;sup>17</sup>Al-Kuhi was a 10<sup>th</sup> century geometer. The context of this passage is a certain al-Sabi questioning a result (in fact incorrect) of al-Kuhi on the center of gravity of a hemisphere, because this result would contradict Archimedes' approximation to  $\pi$  in *Measurement of the Circle*.

<sup>&</sup>lt;sup>18</sup>The Gutas reading is fascinating but dense. There will likely be historical or other references (e.g., that Pahlavi is Middle Persian, the linguistic ancestor of Farsi) you are unfamiliar with, but a quick search on Wikipedia should help orient you.

Day	Reading Due	Lecture	Due
Μ	Hodgkin 66-69. Katz	Brief discussion of spherical trigonometry,	none
10/14	152-153, 306-312.	including Girard's theorem. Transmission of	
21	Med. Sourcebook	the "classical"-now Greek, Islamic, Indian-	
	4-9, 64-75, 85-87.	tradition to the Medieval Latin world.	
W	WiM 165-172. Al-	Renaissance art, perspective, and projective	none
10/16	berti 22-24, 27-30,	geometry	
	33-37, 39-43 (and see		
	explanatory figures		
	in the "Illustrations"		
	section).		
F	Study for midterm	Midterm in-class	Midterm
10/18			in-class
23			
M	WiM 172-188	Projective geometry: cross-ratio, points at	none
10/21		infinity, the theorem of Desargues	
25			
W	Hodgkin 6.1-6.5	Renaissance algebra and the cubic equation.	none
10/23	(skim), 6.6, 6.9, 6.10	Stirrings of a new science and the conflict	
26		with traditional authorities (Aristotle, the	
		Church).	
<b>D</b>	10 04 00 40 50		<b>C</b> 1 1
F	ME, 34-38, 43-50,	Notation, symbolism, and the new "analy-	Submit
F 10/25	ME, 34-38, 43-50, Hodgkin 6.7	Notation, symbolism, and the new "analy- sis": Stevin, Harriot, Viète, Descartes	Submit final paper
F 10/25 27	ME, 34-38, 43-50, Hodgkin 6.7	Notation, symbolism, and the new "analy- sis": Stevin, Harriot, Viète, Descartes	Submit final paper proposal
F 10/25 27 Day	ME, 34-38, 43-50, Hodgkin 6.7 Reading Due	Notation, symbolism, and the new "analy- sis": Stevin, Harriot, Viète, Descartes Lecture	Submit final paper proposal Due
F 10/25 27 Day M	ME, 34-38, 43-50, Hodgkin 6.7 Reading Due Descartes <i>Discourse</i>	Notation, symbolism, and the new "analy- sis": Stevin, Harriot, Viète, Descartes Lecture Descartes: coordinates and "analytic" geom-	Submit final paper proposal Due none
F 10/25 27 Day M 10/28	ME, 34-38, 43-50, Hodgkin 6.7 Reading Due Descartes <i>Discourse</i> Parts 1, 2, 6. Scanned	Notation, symbolism, and the new "analy- sis": Stevin, Harriot, Viète, Descartes Lecture Descartes: coordinates and "analytic" geom- etry. The <i>Discourse</i> . (Methodology, classifi-	Submit final paper proposal Due none
F 10/25 27 Day M 10/28 28	ME, 34-38, 43-50, Hodgkin 6.7 Reading Due Descartes <i>Discourse</i> Parts 1, 2, 6. Scanned selections from part I	Notation, symbolism, and the new "analy- sis": Stevin, Harriot, Viète, Descartes Lecture Descartes: coordinates and "analytic" geom- etry. The <i>Discourse</i> . (Methodology, classifi- cation of problems, Apollonius's problem.)	Submit final paper proposal Due none
F 10/25 27 Day M 10/28 28	ME, 34-38, 43-50, Hodgkin 6.7 Reading Due Descartes <i>Discourse</i> Parts 1, 2, 6. Scanned selections from part I of <i>The Geometry</i>	Notation, symbolism, and the new "analy- sis": Stevin, Harriot, Viète, Descartes Lecture Descartes: coordinates and "analytic" geom- etry. The <i>Discourse</i> . (Methodology, classifi- cation of problems, Apollonius's problem.)	Submit final paper proposal Due none
F 10/25 27 Day M 10/28 28 W	ME, 34-38, 43-50, Hodgkin 6.7 Reading Due Descartes <i>Discourse</i> Parts 1, 2, 6. Scanned selections from part I of <i>The Geometry</i> ME, 50-53, 62-69,	Notation, symbolism, and the new "analy- sis": Stevin, Harriot, Viète, Descartes Lecture Descartes: coordinates and "analytic" geom- etry. The <i>Discourse</i> . (Methodology, classifi- cation of problems, Apollonius's problem.) More analytic geometry and the beginnings	Submit final paper proposal Due none
F 10/25 27 M 10/28 28 W 10/30 20	ME, 34-38, 43-50, Hodgkin 6.7 Reading Due Descartes <i>Discourse</i> Parts 1, 2, 6. Scanned selections from part I of <i>The Geometry</i> ME, 50-53, 62-69, 71-74, 78-84	Notation, symbolism, and the new "analy- sis": Stevin, Harriot, Viète, Descartes Lecture Descartes: coordinates and "analytic" geom- etry. The <i>Discourse</i> . (Methodology, classifi- cation of problems, Apollonius's problem.) More analytic geometry and the beginnings of calculus: Fermat	Submit final paper proposal Due none none
F 10/25 27 Day M 10/28 28 W 10/30 29 E_11/1	ME, 34-38, 43-50, Hodgkin 6.7 Reading Due Descartes <i>Discourse</i> Parts 1, 2, 6. Scanned selections from part I of <i>The Geometry</i> ME, 50-53, 62-69, 71-74, 78-84	Notation, symbolism, and the new "analy- sis": Stevin, Harriot, Viète, Descartes Lecture Descartes: coordinates and "analytic" geom- etry. The <i>Discourse</i> . (Methodology, classifi- cation of problems, Apollonius's problem.) More analytic geometry and the beginnings of calculus: Fermat	Submit final paper proposal Due none none
F 10/25 27 M 10/28 28 W 10/30 29 F 11/1 20	ME, 34-38, 43-50, Hodgkin 6.7 Reading Due Descartes <i>Discourse</i> Parts 1, 2, 6. Scanned selections from part I of <i>The Geometry</i> ME, 50-53, 62-69, 71-74, 78-84 Katz 532-539, ME	Notation, symbolism, and the new "analy- sis": Stevin, Harriot, Viète, Descartes Lecture Descartes: coordinates and "analytic" geom- etry. The <i>Discourse</i> . (Methodology, classifi- cation of problems, Apollonius's problem.) More analytic geometry and the beginnings of calculus: Fermat Beginnings of the calculus, continued: van	Submit final paper proposal Due none none
F 10/25 27 M 10/28 28 W 10/30 29 F 11/1 30	ME, 34-38, 43-50, Hodgkin 6.7 Reading Due Descartes <i>Discourse</i> Parts 1, 2, 6. Scanned selections from part I of <i>The Geometry</i> ME, 50-53, 62-69, 71-74, 78-84 Katz 532-539, ME 105-106	Notation, symbolism, and the new "analy- sis": Stevin, Harriot, Viète, Descartes Lecture Descartes: coordinates and "analytic" geom- etry. The <i>Discourse</i> . (Methodology, classifi- cation of problems, Apollonius's problem.) More analytic geometry and the beginnings of calculus: Fermat Beginnings of the calculus, continued: van Heuraet, Gregory, Barrow	Submit final paper proposal Due none none PSet 5
F 10/25 27 Day M 10/28 28 W 10/30 29 F 11/1 30 M	ME, 34-38, 43-50, Hodgkin 6.7 Reading Due Descartes <i>Discourse</i> Parts 1, 2, 6. Scanned selections from part I of <i>The Geometry</i> ME, 50-53, 62-69, 71-74, 78-84 Katz 532-539, ME 105-106 ME 190-198. Katz	Notation, symbolism, and the new "analy- sis": Stevin, Harriot, Viète, Descartes Lecture Descartes: coordinates and "analytic" geom- etry. The <i>Discourse</i> . (Methodology, classifi- cation of problems, Apollonius's problem.) More analytic geometry and the beginnings of calculus: Fermat Beginnings of the calculus, continued: van Heuraet, Gregory, Barrow Power series: The Kerala School (Madhava)	Submit final paper proposal Due none none PSet 5 none
F 10/25 27 M 10/28 28 W 10/30 29 F 11/1 30 M 11/4 21	ME, 34-38, 43-50,   Hodgkin 6.7   Reading Due   Descartes Discourse   Parts 1, 2, 6. Scanned   selections from part I   of The Geometry   ME, 50-53, 62-69,   71-74, 78-84   Katz 532-539, ME   105-106   ME 190-198. Katz   255-260.	Notation, symbolism, and the new "analy- sis": Stevin, Harriot, Viète, Descartes Lecture Descartes: coordinates and "analytic" geom- etry. The <i>Discourse</i> . (Methodology, classifi- cation of problems, Apollonius's problem.) More analytic geometry and the beginnings of calculus: Fermat Beginnings of the calculus, continued: van Heuraet, Gregory, Barrow Power series: The Kerala School (Madhava) and Newton	Submit final paper proposal Due none none PSet 5
F 10/25 27 Day M 10/28 28 W 10/30 29 F 11/1 30 M 11/4 31	ME, 34-38, 43-50, Hodgkin 6.7 Reading Due Descartes <i>Discourse</i> Parts 1, 2, 6. Scanned selections from part I of <i>The Geometry</i> ME, 50-53, 62-69, 71-74, 78-84 Katz 532-539, ME 105-106 ME 190-198. Katz 255-260.	Notation, symbolism, and the new "analy- sis": Stevin, Harriot, Viète, Descartes Lecture Descartes: coordinates and "analytic" geom- etry. The <i>Discourse</i> . (Methodology, classifi- cation of problems, Apollonius's problem.) More analytic geometry and the beginnings of calculus: Fermat Beginnings of the calculus, continued: van Heuraet, Gregory, Barrow Power series: The Kerala School (Madhava) and Newton	Submit final paper proposal Due none none PSet 5
F 10/25 27 Day M 10/28 28 W 10/30 29 F 11/1 30 M 11/4 31 W	ME, 34-38, 43-50, Hodgkin 6.7 Reading Due Descartes <i>Discourse</i> Parts 1, 2, 6. Scanned selections from part I of <i>The Geometry</i> ME, 50-53, 62-69, 71-74, 78-84 Katz 532-539, ME 105-106 ME 190-198. Katz 255-260. ME section 4.1	Notation, symbolism, and the new "analy- sis": Stevin, Harriot, Viète, Descartes Lecture Descartes: coordinates and "analytic" geom- etry. The <i>Discourse</i> . (Methodology, classifi- cation of problems, Apollonius's problem.) More analytic geometry and the beginnings of calculus: Fermat Beginnings of the calculus, continued: van Heuraet, Gregory, Barrow Power series: The Kerala School (Madhava) and Newton Newton's calculus	Submit final paper proposal Due none none PSet 5 none
F 10/25 27 Day M 10/28 28 W 10/30 29 F 11/1 30 M 11/4 31 W 11/6 22	ME, 34-38, 43-50,   Hodgkin 6.7   Reading Due   Descartes Discourse   Parts 1, 2, 6. Scanned   selections from part I   of The Geometry   ME, 50-53, 62-69,   71-74, 78-84   Katz 532-539, ME   105-106   ME 190-198. Katz   255-260.   ME section 4.1	Notation, symbolism, and the new "analy- sis": Stevin, Harriot, Viète, Descartes Lecture Descartes: coordinates and "analytic" geom- etry. The <i>Discourse</i> . (Methodology, classifi- cation of problems, Apollonius's problem.) More analytic geometry and the beginnings of calculus: Fermat Beginnings of the calculus, continued: van Heuraet, Gregory, Barrow Power series: The Kerala School (Madhava) and Newton Newton's calculus	Submit final paper proposal Due none none PSet 5 none none
F 10/25 27 Day M 10/28 28 W 10/30 29 F 11/1 30 M 11/4 31 W 11/6 32	ME, 34-38, 43-50, Hodgkin 6.7 Reading Due Descartes <i>Discourse</i> Parts 1, 2, 6. Scanned selections from part I of <i>The Geometry</i> ME, 50-53, 62-69, 71-74, 78-84 Katz 532-539, ME 105-106 ME 190-198. Katz 255-260. ME section 4.1	Notation, symbolism, and the new "analy- sis": Stevin, Harriot, Viète, Descartes Lecture Descartes: coordinates and "analytic" geom- etry. The <i>Discourse</i> . (Methodology, classifi- cation of problems, Apollonius's problem.) More analytic geometry and the beginnings of calculus: Fermat Beginnings of the calculus, continued: van Heuraet, Gregory, Barrow Power series: The Kerala School (Madhava) and Newton	Submit final paper proposal Due none none PSet 5 none none
F 10/25 27 Day M 10/28 28 W 10/30 29 F 11/1 30 M 11/4 31 W 11/6 32 F 11/8 22	ME, 34-38, 43-50, Hodgkin 6.7 Reading Due Descartes <i>Discourse</i> Parts 1, 2, 6. Scanned selections from part I of <i>The Geometry</i> ME, 50-53, 62-69, 71-74, 78-84 Katz 532-539, ME 105-106 ME 190-198. Katz 255-260. ME section 4.1 ME section 4.2	Notation, symbolism, and the new "analy- sis": Stevin, Harriot, Viète, Descartes Lecture Descartes: coordinates and "analytic" geom- etry. The <i>Discourse</i> . (Methodology, classifi- cation of problems, Apollonius's problem.) More analytic geometry and the beginnings of calculus: Fermat Beginnings of the calculus, continued: van Heuraet, Gregory, Barrow Power series: The Kerala School (Madhava) and Newton Newton's calculus	Submit final paper proposal Due none none PSet 5 none none

Day	Reading Due	Lecture	Due
М	Katz 552-553. Prin-	Newton's Principia Mathematics: introduc-	none
11/11	cipia introduction and	tion and Kepler's first law.	
34	preface, first 5 defi-		
	nitions, laws of mo-		
	tion and corollary 1,		
	section 1 lemmas 1,		
	2, 6, 7 and scholium		
	(scanned selections 1-		
	13, 19-20, 28, 30, 33-		
	34). Brackenridge, 3-		
	11.		
W	Look over the peer-	In-class peer-editing exercise	Bring 2
11/13	editing worksheet		printed
35			copies of
			your paper
			(so far) to
			class for
			peer review
F	Principia Book I sec-	Kepler's laws and Principia, continued: con-	PSet 6
11/15	tions 2-3: Prop 1 Thm	ical orbits imply the inverse square law for	
36	1, Prop 6 Thm 5, Prop	gravity, and conversely.	
	11 Prob 6, Prop 13		
	Prob 8, and Corollary		
	1 following (scanned		
	36, 41-42, 49-50, 52-		
	53)		
M	Complete Principia	Catch-up: finish discussing the Principia.	none
11/18	readings. Review	Newton's discussion of curvature.	
37	Katz 552-553. Begin		
	readings for W/F.		
W	Stillwell 320-323,	Vista: Cantor and infinity. Set theory and	none
11/20	GEB 3-28, 33-36,	foundational crises.	
38	46-51.		
F 11/22	GEB 74-102. Still-	Infinity, continued: Gödel's theorem. Math-	none
11/22	well 87-105	ematical logic and the theory of computa-	
39 M			DG - 4 7
IVI 11/25	Hilbert s Founda-	Euclid redux: Hilbert's <i>Foundations</i> . Vista:	PSet /
11/25	1 22 Deinsorf 55	(Saashari Taurinus)	
40	1-22. Poincare $53$ - 50 <sup>19</sup> Vote 600 604	(Saccheri, Taurinus).	
	39, Naiz 089-094, 830 841		
	Doinconá 50 (5 ((	Non Evalidaan gaamatery aantigwad	
W 11/07	Foundare 39-03, 00-	iomatics (Polyoi Loboshavely) and availate	none
11/2/	07, 74-00 Katz 841-	iomatics (Bolyai, Lobacnevsky), and explicit	
41 E	040. Thenkseiving	Thonkogiving vection	nonc
Г 11/20	manksgiving	i nanksgiving vacation	none
11/29			

<sup>19</sup>Follow page numbers in the book itself, not in the pdf file.

Day	Reading Due	Lecture	Due
М	Spivak 1-12. Op-	Models of non-Euclidean geometry, contin-	none
12/2	tional reading for en-	ued: curvature revisited and the foundations	
42	thusiasts: Spivak 65-	of differential geometry of surfaces (Euler,	
	69.	Gauss).	
W	Optional reading for	Constructible numbers and intimations of	Final paper
12/4	enthusiasts: CR 117-	Galois theory: the resolution of the classi-	due in-
43	125, 127-139	cal constructibility problems (trisection of an	class, PSet
		angle, doubling of a cube). Gauss on the	8 due (orig-
		constructibility of the regular 17-gon.	inally due
			Monday)