

<b>Instructor</b>	Amites Sarkar
<b>Text</b>	A Concise History of Mathematics Dirk Struik
<b>Credits</b>	3
<b>Class dates</b>	Monday 27 June – Thursday 4 August
<b>Class time</b>	2:30–3:50 pm Monday, Tuesday and Thursday (if participating synchronously)

### **Preface**

This course will take place online through Canvas and Zoom. The ideal way to participate is synchronously, at the regularly scheduled meeting time of 2:30–3:50 pm on Mondays, Tuesdays and Thursdays (I will host a Zoom meeting and invite everyone on the class list). However, I will record each class meeting, and make the recordings available through Canvas, so it will be possible to complete the class asynchronously, if need be. The grading will be based on written homework, covering both mathematical and historical topics.

### **Overview**

It has been said that the insights of one generation become the instincts of the next. Subjects such as differential calculus were once a secret art understood only by a coterie of specialists – today they are taught to millions of people worldwide every year. The famous mathematician Louis Mordell once wrote:

*Mathematical study and research are very suggestive of mountaineering. Whymper made several efforts before he climbed the Matterhorn in the 1860's and even then it cost the life of four of his party. Now, however, any tourist can be hauled up for a small cost, and perhaps does not appreciate the difficulty of the original ascent. So in mathematics, it may be found hard to realise the great initial difficulty of making a little step which now seems so natural and obvious, and it may not be suprising if such a step has been found and lost again.*

This is precisely what makes the study of the history of mathematics both interesting and difficult. We have to try to get inside the minds of people who thought in a very different way and who did not have access to intellectual tools that we take for granted. A good example of such an intellectual tool is the number 0.

### **Class activities**

Expect lectures and discussions.

## **Weekly Schedule**

### **Week 1**

Introduction; definitions of mathematics; pure and applied mathematics; the origins of writing and counting; some ancient civilizations; comparison of different number systems

### **Week 2**

Egyptian arithmetic and geometry; early Greek mathematics; Thales; the Pythagoreans; Pythagorean triples; Zeno, Eudoxus and Hippocrates; Plato's Academy; the Museum at Alexandria; Euclid's Elements

### **Week 3**

Euclid's number theory; Eratosthenes and the Earth; Aristotle, Aristarchus and the Moon; Ptolemy's Almagest; Archimedes; Diophantus, Pappus and Hypatia; Constantinople

### **Week 4**

Aryabhata, Brahmagupta, Mahavira, Bhaskara; Al-Biruni; Europe in the 1300s; the battle of the scholars - del Ferro, Fiore, Tartaglia, Cardan and Bombelli

### **Week 5**

Al-Khwarizmi on quadratics; Cardan on cubics; Ruffini, Abel and Galois; examples of good mathematical writing, and what we can learn from them; Galileo; Tycho Brahe and Kepler; Descartes

### **Week 6**

Newton; Leibniz; the "problem of the points" as solved by Fermat and Pascal

## **Grading and Homework**

There will be six written homework assignments, which will be posted online at regular intervals on the Canvas page. The first two will be worth 10%, and the last four will be worth 20% of the final grade. Both mathematical and historical topics will be covered. The source material is class lectures and the textbook. You should send me your solutions through Canvas, and I will provide feedback and evaluation of your work based on both the mathematical content and the writing style. I will also provide a list of writing resources on the Canvas page.

There will be no exams, but you are responsible for reading the parts of the book corresponding to the topics covered, for viewing each class either synchronously or asynchronously, and for completing the writing assignments, which I'll discuss in more detail in class. This is a Writing Proficiency course, so the majority of your grade will be based on the quality of your writing and the clarity of your ideas and arguments.

## **Course objectives**

The successful student will demonstrate an understanding and appreciation of:

- The development of mathematics as a creative human activity
- The evolution of mathematical ideas over time
- The structure and rigor of mathematics as viewed from a historical perspective
- The relationships between different parts of mathematics
- The importance of primary sources

## **Office hours**

My office hours are 12–12:50pm on Mondays, Tuesdays, Wednesdays and Thursdays. These will occur using Zoom. My e-mail is amites.sarkar@wwu.edu

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