Mathematics 3810H – Ancient and Classical Mathematics

Trent University, Winter 2022 *(Last modified 2022-01-04.)*

MATH 3810H traces the development of mathematics in the Middle East and the Mediterranean from prehistory to the end of the classical period.

Instructor

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Department of Mathematics

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Prerequisite

MATH 1120H *Recommended:* MATH 2200H or MATH 2350H.

Text

The Historical Roots of Elementary Mathematics, by Lucas N.H. Bunt, Phillip S. Jones, & Jack D. Bedient, Dover Publications, New York, 1988, ISBN 0-486-25563-8.

We will also make some use of the following:

A Short Account of the History of Mathematics (4th Edition), by W. W. Rouse Ball, 1908. Available for free from Project Gutenberg at: `www.gutenberg.org/etext/31246`

Some additional readings will be assigned from other sources available online.

Meetings

Lectures: Tuesday 13:00-13:50 in ENW 110, Wednesday 13:00-13:50 in ENW 111, and Friday 11:00-11:50 in DNA B105
Seminars: Friday 12:00-12:50 in DNA B105.

Marking Scheme

There will be at least six fortnightly assignments, a project (including a proposal), and a take-home final examination. The final mark will be calculated as follows:

Best 5 assignments (7% each)	35%	Project	29%
Project proposal	4%	Final Examination	32%

At least 25% of the course marks will be obtained by the final date (Friday, 11 March) to withdraw from Winter half-courses without academic penalty. Students who are unable to hand in assignments on time for reasons beyond their control should contact the instructor as soon as possible.

This scheme may be modified for students in exceptional circumstances. Any such modification will require the agreement of both the student and the instructor.

Content & Learning Outcomes

MATH 3810H is a survey of the development of mathematics in the Mediterranean and the Middle East to the end of the classical period, with particular attention to the development of number systems, arithmetic, and algebra in ancient Egypt and Mesopotamia, and the development of rigour and geometry in ancient Greece and in the Hellenistic and Roman periods. Students will be exposed to the problem of interpreting the available data (*e.g.* the various interpretations of the cuneiform tablet Plimpton 322), and will read portions of several original sources in translation.

Archive Page

A web page at `euclid.trentu.ca/math/sb/3810H/` archives materials from past iterations of this course. Materials from this iteration will be uploaded there too.

Readings & Schedule

The following schedule is *tentative* – no lesson plan survives contact with students! – and our actual pace will be adjusted as necessary. Most of our readings will be from the textbook, *The Historical Roots of Elementary Mathematics*, by Lucas N.H. Bunt, Phillip S. Jones, & Jack D. Bedient, hereinafter referred to as *BJB*. Some readings are given from *A Short Account of the History of Mathematics* (4th Edition), by W. W. Rouse Ball, hereinafter referred to as *Ball*. Some additional readings will also be given from time to time, from sources available online. (See the course web page for links when the time comes.)

Week 1. *(10-14 January) BJB §1-1–1-8; Ball Chapter I.* Mathematics in prehistory. Historical evidene and its limitations. Egyptian number system, arithmetic operations and algorithms, fractions.
Week 2. *(17-21 January) BJB §1-9–1-11 & §2-1–2-3.* Algebra and geometry in ancient Egypt; Mesopotamian number system and arithmetic. Assignment #1 due on Friday, 21 January.
Week 3. *(24-28 January) BJB §2-4–2-9; Words and Pictures: New Light on Plimpton 322.* Mesopotamian algebra and geometry.
Week 4. *(31 January – 4 February) BJB 3-1–3-5; Ball Chapters II & VII.* Early Greek mathematics, Greek number systems. Assignment #2 and project proposal due on Friday, 4 February.
Week 5. *(7-11 February) BJB §3-6–3-10; Ball Chapter II.* Pythagorean number theory and geometry, incommensurables.
Week 6. *(14-18 February) BJB 4-1–4-5; Ball Chapter III.* Development of Greek geometry, quadrature, proportion, geometric algebra, systematization. Assignment #3 due on Friday, 18 February.
Reading Week. *(21-25 February)* Enjoy! *University closed for Family Day on Monday, 21 February.*
Week 7. *(28 February – 4 March) BJB §5-1–5-5 & 6-1–6-5; Ball Chapter V.* Logic, rigour, Euclid's *Elements*.
Week 8. *(7-11 March) BJB §6-6–6-14* More on Euclid's *Elements*. Assignment #4 due on Friday, 11 March. *The last date to drop the course without academic penalty is Friday, 11 March.*
Week 9. *(14-18 March) BJB §7-1–7-3; Ball Chapter IV; The Sand-Reckoner*. Hellenistic mathematical physics, computation of areas and volumes, number systems.
Week 10. *(21-25 March) BJB §7-4–7-7; Ball Chapter V.* Hellenistic astronomy, trigonometry, algebra. Assignment #5 due on Friday, 25 March.
Week 11. *(28 March – 1 April) BJB §7-8–7-11.* Influence of ancient and classical mathematics. Take-home final examination distributed on Friday, 1 April.
Week 12. *(4-8 April)* Catch-up and clean-up. Assignment #6 due on Friday, 8 April. *Friday, 3 April, is the last day of classes.*
Examination period. *(11-27 April)* Project and take-home final examination due on Friday, 22 April.

Academic Integrity

> *Academic dishonesty, which includes plagiarism and cheating, is an extremely serious academic offence and carries penalties varying from failure on an assignment to expulsion from the University. Definitions, penalties, and procedures for dealing with plagiarism and cheating are set out in Trent Universitys Academic Integrity Policy. You have a responsibility to educate yourself – unfamiliarity with the policy is not an excuse. You are strongly encouraged to visit Trents Academic Integrity website to learn more:* `www.trentu.ca/academicintegrity` .

For clarity, the following guidelines will apply in MATH 3810H:

> You are permitted and encouraged to work together and ask anyone willing (especially the instructor!) for explanations, hints, and suggestions on the assignments and projects, and to consult whatever sources you wish, with the exception that **you may not consult anyone who has taken a similar course recently or their work**. However, **all work submitted for credit must be written up entirely by you** (with the exception of group projects)**, giving due credit to all relevant sources of help and information**. The take-home final exam will have more restrictive conditions that will be spelled out on the exam.

Access to Instruction

> *It is Trent University's intent to create an inclusive learning environment. If a student has a disability and documentation from a regulated health care practitioner and feels that he/she may need accommodations to succeed in a course, the student should contact the Student Accessibility Services Office (SAS) at the respective campus as soon as possible.*