History of Mathematics
MAT 505
Semester
Credits 3

Course Description
Mathematics, like other subjects, is an intellectual product of culture, society, and creative people. This course will discuss the characteristics of the Western mathematics, Islamic, Indian, and the Chinese ones. The development of algebra in the Medieval and the Renaissance, and the formation of the differential and integral calculus will also be discussed. The general trends of mathematics in the eighteenth and nineteenth centuries, and the first half of the twentieth century will be outlined. It will also explore how culture-centered different mathematics merged into a universal modern one.

Prerequisites/Co-requisites
Students must have taken (or been exempt from) MAT 206, MAT301, MAT302.

Student Learning Outcomes
- Students will learn characteristics of Babylonian mathematics.
- Students will learn characteristics of Egyptian mathematics.
- Students will learn characteristics of Greek mathematics.
- Students will learn characteristics of Chinese mathematics.
- Students will learn characteristics of Indian mathematics.
- Students will learn characteristics of Muslim mathematics.
- Students will learn the development of algebra in the Middle Ages and the Renaissance.
- Students will have a general view of the formation of the calculus.
- Students will understand the general trends of mathematics in the 18th and 19th centuries.
- Students will be able to comprehend how traditional Chinese mathematics merges with modern Western mathematics.

Required Text & Readings
No textbook is required. Hand-outs will be provided in class. PDF files may be downloadable from Blackboard. Web links on the history of mathematics may also be on Blackboard.

Evaluation & Requirements of Students
Students are required to write FOUR 5-page short essays (double space) or ONE 15-page research paper (also double space).
Arriving late or leaving early will be treated as lateness on the attendance roster. During class time 1) all cell phones MUST be powered off or set into vibration mode; 2) headphones, walkman, CD players, PSP, and iPod, are NOT allowed in the classroom; 3) all children or non-enrolled persons are not permitted to attend class.

The final grade will be defined in the following manner:
Attendance 10%
Class Participations 20%
Essays or Paper 70%

Index of the Grade Definitions:
93 – 100 % A
90 – 92 % A-
87 – 89 % B+
83 – 86 % B
80 – 82 % B-
77 – 79 % C+
73 – 76 % C
70 – 72 % C-
67 – 69 % D+
63 – 66 % D
60 – 62 % D
Below 60 % F

Outline of Topics
Traditional Chinese Mathematics
Historiography of Chinese Mathematics in English
A brief outline of Chinese Mathematics
Ten Classics of Mathematical Texts

Chinese numeration system
*Jiuzhang Suanshu* (Nine Chapters)
Chinese Reminder Theorem
*Siyuan Yujian* (Jade Mirror of the Four Unknowns)
Solving a numeral equations with four unknowns
Hand-out taken from *Fleeting Footsteps: Tracing the Conception of Arithmetic and Algebra in Ancient China*, by Lam Lay Yong and Ang Tian Se (revised edition, World Scientific, 2004), and the *Jade Mirror of the Four Unknowns*, translated by Chen Zaixin (Liaoning Education Press, 2006)

Babylonian Mathematics
Cuneiform notation
Sexagesimal (base 60) system
Four basic operations,
Babylonian reciprocal table 4
Read: Otto Neugebauer, *The Exact Sciences in Antiquity* (Penguin paperback edition), the chapter on Babylonian mathematics
Website: The MacTutor History of Mathematics Archive: http://www-groups.dcs.st-and.ac.uk/~history/ Ancient Babylonian Mathematics

Elementary geometry
The Pythagorean Theorem, Plimpton 322 tablet
Square roots, quadratic equations

Egyptian Mathematics
Numerals
Multiplication and division
Unit fractions
Read: Otto Neugebauer, *The Exact Sciences in Antiquity* (Penguin paperback edition), the chapter on Egyptian mathematics
Richard J. Gillings, *Mathematics in the Time of the Pharaohs*
Website: The MacTutor History of Mathematics Archive: http://www-groups.dcs.st-and.ac.uk/~history/ Ancient Egyptian Mathematics

Geometry (calculating volume of truncated pyramid, surface area of semisphere)
Greek Mathematics
Pythagoras and his School
Discovery of Irrational Numbers
Euclid’s Elements
Mathematical Education in Ancient Greece
Read: Otto Neugebauer, *The Exact Sciences in Antiquity* (Penguin paperback edition), the chapter on Egyptian mathematics
Euclid’s Elements (Heath’s English edition)
Website: The MacTutor History of Mathematics Archive: http://www-groups.dcs.st-and.ac.uk/~history/AncientGreekMathematics

Squaring the circle
Doubling the cube
Trisecting an angle
Proof of Elements, Book 1, proposition 47

Archimedes and the Palimpsest
See the websites: http://archimedespalimpsest.org

Visiting the Archive of David Eugene Smith at Columbia University

Mathematical Methods in Hellenistic Times
Early trigonometry

Ptolemy and the Almagest
Diophantus and Greek algebra, Pappus and analysis

Ancient and Medieval India
The Hindu-Arabic place-value system and arithmetic


Ancient and Medieval India (continued)
Geometry
Equations and indeterminate analysis
Combinatorics, trigonometry

The Mathematics of Islam
Decimal arithmetic
Algebra: quadratic equations, powers of the unknown,
Arithmetic triangle, cubic equations


The Mathematics of Islam (continued)
Combinatorics 6
Geometry: parallel postulate, trigonometry

Mathematics in Medieval Europe
Translations from Arabic into Latin in the 12th and 13th centuries
Summary of early mathematics in Western Europe

Algebra in the Renaissance
The Italian abacists, algebra in France, Germany, England, and Portugal
The solution of the cubic equation
Early development of symbolic algebra: Viéte and Stevin

Geometry, Algebra, and Probability in the Seventeenth Century
The theory of equations
Analytic geometry: coordinates, equations of curves

Geometry, Algebra, and Probability in the Seventeenth Century (continued)
Elementary probability
Number theory
Projective geometry

The Beginnings of the Calculus
Tangents
Extrema

The Beginnings of the Calculus (continued)
Areas and volumes
Power series
Rectification of curves
The fundamental theorem of calculus

Isaac Newton

Gottfried Leibniz

Priority Disputes

Mathematics in the Eighteenth Century

Mathematics in the Nineteenth Century

Mathematics in the First Half of the Twentieth Century
Merge of Chinese Mathematics into Modern Western Mathematics


**College Attendance Policy**

At BMCC, the maximum number of absences is limited to one more hour than the number of hours a class meets in one week. For example, you may be enrolled in a three-hour class. In that class, you would be allowed 4 hours of absence (not 4 days). In the case of excessive absences, the instructor has the option to lower the grade or assign an F or WU grade.

**Academic Adjustments for Students with Disabilities**

Students with disabilities who require reasonable accommodations or academic adjustments for this course must contact the Office of Services for Students with Disabilities. BMCC is committed to providing equal access to all programs and curricula to all students.

**BMCC Policy on Plagiarism and Academic Integrity Statement**

Plagiarism is the presentation of someone else’s ideas, words or artistic, scientific, or technical work as one’s own creation. Using the idea or work of another is permissible only when the original author is identified. Paraphrasing and summarizing, as well as direct quotations, require citations to the original source. Plagiarism may be intentional or unintentional. Lack of dishonest intent does not necessarily absolve a student of responsibility for plagiarism.

Students who are unsure how and when to provide documentation are advised to consult with their instructors. The library has guides designed to help students to appropriately identify a cited work. The full policy can be found on BMCC’s web site, [www bmcc cuny edu](http://www.bmcc.cuny.edu). For further information on integrity and behavior, please consult the college bulletin (also available online).