MAT 3100: History of Mathematics

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Note: There will ultimately be a WebCT page in Virtual Campus where your marks and lots of notes will be stored.

1. **Prerequisites**: Four mathematics (MAT) courses, level 2000 or higher. However, we will cover a large amount of mathematics, so the more math courses the better.

2. **Books and Readings:** We will use many books and many other sources, including the Web. *This course involves lots of reading and study, as we will cover a wide range of topics.*

3. **Attendance:** In the past, I imposed mandatory attendance. For this year, I will not do that at the beginning, but I strongly urge you to attend all classes and take good notes, as the material is not so easy to find. **This is not a passive learning course!** You cannot just sit there and take notes and listen to my lectures and regurgitate them back. You must actively take part: you must read, research, work hard at understanding how the ancient cultures thought about mathematics.

   A lot of books will be on reserve in Morisett library:

   - W. Anglin and J. Lambek *The Heritage of Thales*, Springer Undergrad Texts in Math, 1995. A primary source, which is very good. It is a bit expensive. but available from Amazon.
   - J. Stillwell, *Mathematics and Its History*, Springer. (this excellent book is free via the university's contract with Springer e-books. It is also available very cheaply bound, as a printed e-book.)
   - V. Katz, *A History of Mathematics*, 3rd Edition An excellent book, strongly recommended, but appears to now to be hard to get and very expensive (on Amazon).
   - Howard Eves *An Introduction to the History of Mathematics*, Thompson, Brooks/Cole. Another excellent book, but expensive.

4. **Marking scheme:**

Final Exam	40%
Class Mark	40%
Homework	20%

   The Class Mark will consist of (ii) Two midterm tests (dates, to be announced), (30%), along with possibly in-class short quizzes or short written essays, small projects, class

participation, etc. (10%). Parts of evaluations (tests, essays, finals) may involve writing small essays on assigned topics. Thus you should also be prepared to read a lot of background material. Active class participation and lots of reading will be expected and will be part of your Class Mark.

5. Students *must pass the final exam to pass the course*, independent of your other marks.

6. **Academic Fraud: Important!** All work submitted must be your own work in your own words. You may have discussions with friends but in a course like MAT3100 which is heavily based on writing and discussion: **no copying, sharing, or collaborating on homeworks (unless I give permission)**. All submitted material taken from books, webpages, or other sources (*including my notes!*) must be properly sourced in a proper bibliography. Any copying is cheating and academic integrity will be strictly enforced.

   Here is the university Academic Fraud Website:

   `http://www.uottawa.ca/academic-regulations/academic-fraud.html`

   The following webpage on plagiarism is what Prof. Sajna and I are using this year in MAT1348. Exactly the same policies will be followed in this course. I have asked the marker to be especially vigilant for signs of copying from any (and all) sources.

   `http://mysite.science.uottawa.ca/msajna//teaching/plagiarism_policy.html`

7. Goals and rough idea of the course: Survey the main lines of mathematical development from the Babylonians, Egyptians and Greeks, through the Chinese, Indian, and Islamic mathematicians to modern times, focussing on historical themes and their connections with current mathematics. In particular (a rather optimistic goal):

   (a) Egyptian, Sumerian and Babylonian mathematics.

   (b) Greek Mathematics (a major part of the course), including logic, philosophy and foundations of mathematics, number theory, Euclidean geometry and the works of the major Greek scholars. The classic problems (e.g. Zeno's paradoxes, squaring the circle, trisecting the angle). Incommensurables, work of Eudoxus, and the theory of the continuum (e.g. continued fractions). Works of Archimedes and Diophantus.

   (c) Some mathematics of ancient and medieval China and India.

   (d) Mathematics in the Islamic World.

   (e) Mathematics in Medieval Europe: e.g. work of Leonardo of Pisa (Fibonacci).

   (f) Mathematics in the Renaissance: various topics, including Cardano's work on solving cubic and quartic equations.

   (g) 17th Century: the development of the Calculus and infinitesimal methods and applications.

   (h) Some of the above topics will be carried forward to the 19th (or even 20th) centuries, to see where they have led.

An important subsidiary goal will be to follow up some of the major classical problems and theories to their more modern resolutions, as well as other parallel developments in Indian, Chinese, and Arab mathematics. For example, among areas we hope to explore in more detail, we will see how the traditional Greek problems of squaring the circle and trisecting the angle were finally solved by 19th century mathematicians. We shall also briefly discuss the introduction of logic and the axiomatic method as well as different foundations of mathematics starting with the Greek logicians and philosophers, leading to Boole, de Morgan, Frege, Cantor, Russell. If time permits, I will discuss the beginnings of the counter "constructivist" or "intuitionist" movement, starting with Kronecker, then Lebesgue and L. E. J. Brouwer.