Possible Course Project Topics
MA 330 002, Spring 2012

Below is a list of possible course project topics. You are not restricted to completing a project from this list. For each topic, I have listed a mathematical topic and a person who was heavily involved in that topic who might be of interest for biographical reasons. Not all of these topics are appropriate for all students; an appropriate choice of topics depends on your mathematical background.

1. The Erdős-Ko-Rado Theorem: Erdős (combinatorics)
2. Galois' Theorem regarding solvability of polynomials by radicals: Galois (classical and modern algebra)
3. Abel's Theorem regarding the unsolvability of the quintic by radicals: Abel (classical algebra)
4. Quadratic Reciprocity: Gauss (elementary number theory)
5. Fundamental Theorem of Algebra: Euler, Gauss (classical algebra)
6. Hilbert's Third Problem: Hilbert, Dehn (geometry)
7. Brouwer Fixed Point Theorem: Brouwer (topology)
8. The Cayley-Hamilton Theorem: Cayley (linear algebra)
9. Lagrange's Theorem for finite subgroups of a finite group: Lagrange (modern algebra)
10. Stirling's Formula: Stirling (calculus and advanced calculus)
11. Irrationality of $\pi$: various mathematicians (calculus)
12. Hyperbolic Geometry: Poincarè (geometry)
13. Partition Identities: Ramanujan, Percy MacMahon (combinatorics, number theory)
15. Fourier Series: Fourier (calculus)
16. Calculating Machines: Pascal, Leibnitz, Babbage (computer science)
17. Infinite Series: Newton, Maclaurin, Taylor (calculus)
18. Partial Differential Equations (wave equation, heat equation): d’Alembert (calculus)
19. Five Color Theorem: Kempe, Heawood (combinatorics)
20. Cayley’s Tree Theorem: Cayley, Plücker (combinatorics)
21. Catalan Numbers: Catalan (combinatorics)
22. Transcendental nature of $e$: Hermite (analysis)
23. Pell’s Equation: Diophantus, Lagrange (number theory)
24. Euler’s totient function and encryption schemes: various mathematicians (number theory)
25. Least squares methods and linear regression: Gauss (linear algebra)
26. Magic Squares: Stanley, MacMahon, many others (combinatorics, recreational mathematics)
27. Classification of Plane Symmetry Groups: Da Vinci (abstract algebra, art)
(28) Bernoulli Polynomials and Bernoulli Numbers: various mathematicians (combinatorics, number theory, analysis)
(29) Eulerian Numbers: Euler, MacMahon (combinatorics, number theory)
(30) Historical Development of the Integral: Archimedes, Newton, Leibniz, Cauchy, Riemann, Lebesgue (calculus, analysis)
(31) Non-Euclidean Geometry: Bolyai, Gauss, Lobachevsky, others (geometry)
(32) Solutions to cubic and quartic equations: Cardano, Tartaglia, many others (classical algebra)
(33) Fibonacci numbers and the golden ratio: various mathematicians (number theory, combinatorics)