

MATH 12.3 MATHEMATICAL EXCURSIONS
MWF 10:10 - 11:05 AM

Fall '03
ROOM 028 Breslin

Reminder: CREDIT GIVEN ONLY FOR ONE OF MATH 12 AND MATH 16.

Instructor: Dr. David Knee, Office: 100B Adams, Phone: x3-5072
Hours: Mon & Wed 9:35-10:05 AM, e-mail: MATDIK@Hofstra.edu

Textbooks (both are paperbacks):

"Strength in Numbers" by Sherman Stein, Wiley

"The Code Book" by Simon Singh, Anchor Books

Our two primary themes this semester are Secret Codes and Mathematics in Popular Paperbacks. In recent years the great number of well-written popular math books published has been astonishing-- consider the works of John Paulos, Simon Singh, Martin Gardner, Theoni Pappas, Ian Stewart, A.K. Dewdney, Ivars Peterson, Rudy Rucker, William Dunham, Paul Hoffman, Sherman Stein and Keith Devlin for starters. These are serious books written for the well-educated and curious layperson on a variety of novel subjects. They are not text books, they have no exercises, they are not expensive. Often in paperback, they are written to entice, amuse, and share a mathematician's love for his/her art with a serious reader. This trend began with "Number, The Language of Science" written in the 1930's by Tobias Dantzig. This book dealt with the story behind the dry techniques that were usually taught as being all there was to mathematics. Einstein found this revolutionary little book to be "beyond doubt the most interesting book on the evolution of mathematics that has ever fallen into my hands," and in his preface, Dantzig describes his effort as pioneering and it was just that; it is what we would today call a work of 'Humanistic Mathematics'. Many of the mathematics topics he wrote about were unusual in a popular work: infinity, number theory, the ideas of calculus, other bases for numeration.

Other works in a similar spirit appeared soon thereafter: E.T. Bell wrote "Queen of the Sciences" and "Men of Mathematics" in the 30's, "Mathematics for the Million" by Lancelot Hogben also appeared in the 30's and "Mathematics and the Imagination" by Edward Kasner and James Newman in the 40's. In England W.W. Sawyer's "Mathematician's Delight" became available in the 40's too. At a higher level, "What Is Mathematics" by Courant and Robbins (another Math book that Einstein praised), and published in 1941, it recognized that "The teaching of mathematics has sometimes degenerated into empty drill that does not lead to real understanding or greater intellectual independence. The goal is genuine comprehension of mathematics as an organic whole."

What started as a trickle in the 30's is now an avalanche! Of the many marvelous, accessible, well-written Math books presently available for the general public we have picked two and in this course we will fill in the gaps they leave as we go along, to give the student a deeper understanding than a cursory reading would allow. In the process we'll be touching on: Number Theory, Probability, Codes, Geometry, Sequences and Series, Infinite Sets, Math History, Popular Math Literature, Pedagogy and Applications.

Students will be expected to participate to a great degree: taking notes, solving & discussing problems, summarizing class discussions, interpreting reading assignments and presenting problems & solutions at the board. Attendance is taken at every class, is extremely important for success in this course, and counts in your term grade. You'll need a cheap scientific calculator for this course. Save all your notes, HW, returned tests and handouts. When attending office hours, please bring all this material.

Tests: A half-hour quiz worth 50 points, will be given approx. every 2 to 3 weeks and a 100 point full period midterm on Fri., October 24. The Final Exam, worth 150 pts., is officially scheduled for Friday, Dec. 19 at 8 AM!, BUT WE WILL ATTEMPT TO CHANGE THAT TO MONDAY, DEC. 15, FROM 10:30 AM TO 12:30 PM, or perhaps Friday, Dec. 19, 1:30 - 3:30 PM. Preparing for exams and taking them when they are scheduled is extremely important for the student's and the class' progress. Missed exams count as 0. Normally, no make-ups are given. If you know that you will need to miss some exams or that you'll need to be absent frequently, it would be wise to switch sections now.

Students will volunteer each day to summarize and comment on the assigned reading (boil down/explain/question/admit ignorance/remember Math from High School or elsewhere that is relevant/agree or disagree, etc.) and dialogue with the instructor and classmates in that process. Homework problems will appear in the instructor's handouts or emerge from class discussions. In November, pairs of students (or you can work solo if you prefer) will collaborate on reports on popular math books (some are mentioned above)-- a list of further suggestions will be distributed.

- Grades
- a) 4* Quizzes, Midterm, Final: 450 points
 - b) Pair Report on a Popular Math Book, 3 pages: 50 points
 - c) Summaries of Reading Assignments or of your Report on a Popular Math Book (@15 points each): 50* points
 - d) Attendance Grade = $50 - (\# \text{ of absences}) \times (2.5)$: 50 points.

* these are estimates.

Calendar: No classes Mon., Oct. 6, & Mon.-Fri., Nov. 24- 28. LAST DAY TO WITHDRAW FROM THE COURSE IS MON., NOV. 10. Last class is Wed., Dec. 10. Optional (review) class on reading day Fri. Dec. 12 (or Thurs., Dec. 11).

Exemptions from the Final may be possible for those of you who miss no exams, achieve a B or higher average (at least 83) on all the exams, complete all assignments, have good attendance, participate abundantly in the class work, and show proficiency in the material covered after the last quiz.

Averages: Except for exemptees (whose grades will be curved differently), your lowest 100 points on any exam including the final is dropped (i.e. 2 quizzes, the midterm or 2/3 of the final). Numbers are turned into letter grades thus, [80, 83) = B-, [83, 87) = B, [87, 90) = B+, etc.

HW Assignments: For the earlier material we'll cover approximately 20 pages/day, 2 students volunteer to summarize 10 pages each. We'll cover less per day as the material gets harder.

Weeks 1, 2 & 3: Part I of Stein @ 3 chapters per day

Quiz #1: Fri., Sept. 19

Weeks 3, 4 & 5: Chaps. 1, 2 & 3 of Singh

Quiz #2: Oct. 3

Weeks 6, 7 & 8: Part II of Stein

Midterm: Oct. 24

Weeks 9 & 10: Chaps. 4 & 5 of Singh

Submit choice of Book Report partner and book by Nov. 7

Quiz #3: Nov. 14

Week 10 & 11: Part III of Stein

Book Report due: Nov. 21

Week 12, 13 & 14: Chaps. 6, 7 & 8 of Singh

Quiz #4: Dec. 5

Official last day of classes: Dec. 10, with optional extra day Dec. 12 (or 11)

Final: Dec. 15 or 19.