Math 102: Mathematics for Liberal Arts
Students

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Abstract

This document aims to set the goals for Math 102 by specifying a more detailed and flexible syllabus.

1 Catalog description

“For students whose primary interest is neither engineering nor science; promotes the understanding of mathematical thinking in a variety of topics, including common real-world problems; uses puzzles and experiments to motivate the material. Topics include probability, statistics, and/or other topics chosen by the instructor.
Prerequisite: MTH 020 or score of xxx the CUNY proficiency/placement exam.”

2 Aims of the course

There are two aims:

• convince the students that math is more than memory or formulas,

• convince the students that math is present in every aspect of modern living.
If there are a couple of students interested in math (or science) at the end of the term, and a dozen or so who understand how someone else could be interested, then the course should be considered a success.

More practically, students leaving this course should have basic numeracy (the ability to do arithmetic with a calculator and to do rough estimation). They should have some competence in writing mathematical statements (avoiding pronouns and open grammar). They should understand the concept of algorithm.

3 The students

No data as to who takes this course has yet been compiled. It would be advantageous to track students: what percentage have taken MTH 030, how many semesters have students been in college, how many graduate (and with what majors) within 5 years of taking the course, et cetera.

In my experience, the students belong to three castes. The lowest caste is incapable of adding fractions or solving the equation $4 + c = 3$. Typically, this caste also seems to have difficulty attending class or doing homework, and seems to have exceptionally vulnerable health during scheduled exams. The middle caste is interested and has basic math skills, but a short attention span. Members of this caste are destined to pass this course and may even earn an A. The highest caste, about 10% of my students, is both able and extremely interested in learning. These students deserve to be challenged and exposed to interesting math: their interests are outside of science but this may be an error of misinformation or youth.

I propose allowing an A in MTH 102 to satisfy a MTH 030 requirement. This change is aimed at the third caste, who in most cases (anecdotally) already have credit for MTH 030.

How to track progress and success of this course? Some ideas are

- How many students take another math course after passing MTH 102?
- How do MTH 102 students perform on the CPE, relative to peers?
- Track enrollment (including drops) in this course.
- Track the grades (overall GPA, course grade) for students.
4 Syllabus

The syllabus is divided into several “modules”. Instructors are strongly encouraged to include the modules on Probability, Statistics, and the COM-PASS exam. The remaining course time is to be spent on additional topics following the tastes of the instructor and students.

5 Exam Policies

Exam and homework policies vary wildly from instructor to instructor. A valuable resource for MTH102 instructors would be a library of old exams. I envision distributing samples of these to students. In the interest of creating such a bank of problems, I propose the following guidelines for exams.

- The first page of the exam should contain the date of the exam, the name of the module that the exam covers, the name of the instructor, space for the students name and ID number, and a statement of the ground rules for the exam (including the time allowed for the exam). The first page should not contain any problems.

- Standard ground rules: Students are allowed to use calculators, but not cell-phones. Students should remove sunglasses and brimmed hats. Students should use a pencil, not a pen. Students should not confer with one another. Any questions asked during the exam must be asked before any students have left, so students should look through the exam early in the period.

- The value of each problem (number of points) should be clearly labeled on the exam.

- At some point after the exam has been graded, the instructor should provide a copy of the exam (please improve any rough spots that surfaced during the test period or during grading) to the main office for storage in the exam bank.

6 Modules

- Probability (counting, independence, uniform distribution, genetics, paradoxes)
• Statistics (averages, dispersion, normal distribution, z-statistics)
• Voting and Apportionment (Alabama paradox, Ranked preference voting systems)
• Graphs (Euler cycles, Hamiltonian cycles, planarity)
• Numeration systems (base-b number systems, Modular arithmetic)
• mth 030 (linear equations, ratios and percents)
• Sequences (recognize a sequence of numbers, Fibonacci numbers, golden ratio)
• tiling (?)
• Sudoku
• Geometry (area, volume)
• Finance (simple interest, compound interest)
• COMPASS exam (reading graphs)
• Infinities (countable, uncountable, diagonalization)
• Cryptography (Caesar, Monoalphabetic, Vigenere, index of coincidence, frequency analysis)