

Math 193 (Online)
Mathematical Thinking
St. Cloud State University
Summer 2009

Instructor Information

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Course Information

Course description: Development of problem solving and decision making strategies using mathematical tools from arithmetic, algebra, geometry, probability, and statistics. Skills to communicate and defend solutions and decisions.

Location: Online

Prerequisite(s): MATH 070 (Elementary algebra), a recent ACT math score of 21, or a satisfactory score on the Accuplacer math placement test (70 on the Elementary Algebra portion).

Continuing Studies FAQ: <http://www.stcloudstate.edu/continuingstudies/distance/faq.asp>

Textbooks

Required reading: *Excursions in Modern Mathematics*, Peter Tannenbaum, Prentice Hall, 6th edition / 2007, ISBN-9780131873636 or ISBN-9780132319133.

Recommended reading: *Student Resource Manual*, Buske, Prentice Hall, 6th edition / 2007, ISBN-9780131873827.

Additional Materials

A scientific calculator: Ideally, you will need a calculator with at least the following keys: π , (,), $\sqrt{\quad}$, y^x , x^2 , and !. Please ask me if you have any questions about a particular calculator or if you would like a suggestion as to what to purchase. The TI-30 series is generally good (and inexpensive).

Who should take Math 193

This course meets the general education requirements for Core 3 and Goal Area 4. Math 193 is a Level 3 course - requiring a score of 21 or higher on the math ACT, score of 70 or higher on the Elementary Algebra portion of the Accuplacer placement test, or a grade of "C-" or better in Math 070 (Basic Math Skills). If you have not met these requirements you should transfer immediately to a course that is appropriate for your skills level. You will not be able to change to a different course later in the semester.

If your intended major has a different required mathematics course, that course will satisfy the Core 3 or Goal Area 4 general education requirement. All business majors, most science majors, many pre-professional programs as well as engineering, aviation, computer science, mathematics, and statistics majors require a different mathematics course. Students with those majors should not be enrolled in Math 193. Math 193 is not meant to prepare you for a precalculus or calculus class. Check with the Mathematics Department immediately to determine the appropriate course for your intended major.

Note to Elementary Education, Early Childhood and Special Education Majors: A grade of 'C-' or better in MATH 193 is a prerequisite for MATH 330. *Math 112 should be used as the prerequisite for Math 330 and should be taken *instead* of Math 193 by Elementary Education majors who opt to take the middle grades mathematics specialty.¹

Course Goals

This course is designed to involve students in the exploration and analysis of some of the ideas of modern mathematics. Students will acquire a view of mathematics entirely different from the traditional algebra-geometry-trigonometry math curriculum. The connection between the mathematics presented here and down-to-earth, concrete real-life problems will be direct and immediate. Topics to be discussed include the mathematics of social choice (e.g. weighted voting and fair division), growth and symmetry, probability and statistics. Essentially, this is the material found in chapters 2, 3, 9, 10, 11, 13, 14, and 15 of the text.

¹Elementary Education requires that students earn a grade of C or better in all required teacher education classes. This means that they can get a C- in Math 193 (a general education course), but must get a grade of C (NOT C-) or better in Math 330.

Student Learning Outcomes

Students will

- represent a weighted voting system using a mathematical model.
- use the Banzhaf and Shapley-Shubik power indices to calculate the distribution of power in a weighted voting system.
- state the fair-division problem and identify assumptions used in developing solution methods.
- recognize the differences between continuous and discrete fair-division problems.
- apply the divider-chooser, lone-divider, lone-chooser, and last-diminisher methods to continuous fair-division problems.
- apply the method of sealed bids and the method of markers to a discrete fair-division problem.
- apply the quadratic formula to algebraically solve quadratic equations.
- effectively use subscript notation to solve problems involving both recursive and explicitly defined sequences.
- demonstrate an understanding of the concept of similarity of geometric objects and will solve related proportion problems.
- identify patterns involving recursive and explicitly defined sequences.
- demonstrate an understanding of linear and exponential growth and will use arithmetic and geometric sequences to solve real-world problems.
- apply the compound interest formula to solve financial problems.
- define the four basic rigid motions in the plane and will classify two-dimensional shapes using symmetry types.
- classify border patterns according to their symmetry type.
- differentiate between a parameter and a statistic.
- define statistical terms related to sampling methodology.
- identify various sampling biases.
- demonstrate an understanding of the concept of sampling variability.
- compare and contrast different methods of sampling.
- numerically summarize a data set using measures including mean, median, percentiles, five-number summaries, and standard deviation.
- develop and interpret graphical summaries of data including bar charts, histograms, pie charts, and box and whisker plots.

- apply various counting techniques including the multiplication rule, combinations, and permutations.
 - demonstrate an understanding of basic concepts of probability. As such they will calculate probabilities of events derived from a random experiment.
 - construct sample spaces that model random experiments.
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Dishonesty Policy

University policy is clear: *Work submitted by an individual as her/his own course work in connection with an application for a position, promotion, tenure, salary increase, or other academic activity must be academically honest and a product of his or her own efforts. (A.II, 2.4, SUB.d.2, Professional and Ethical Standards for Employees and Students).*

Cheating will simply not be tolerated. Any suspected incidence of dishonesty will be reported to the academic Vice-President of Student Affairs. Consequences of such conduct are outlined on the SCSU website. **Proctors found to be aiding student misconduct will face even more severe penalties.**

Calendar

This course has been designed to finish in 50 academic days and you would be wise to follow the suggested pace. However, the design is flexible in allowing students to work ahead if they wish. If circumstances dictate, with the approval of the instructor, students may be allowed to make up late work. The only “hard” deadlines in the course are for the exams. Past experience has shown that falling behind the suggested pacing does not lead to success. **For Summer 2009, the absolute last day to take quizzes, exams, or submit the project is Friday, August 14th.**

Incomplete Policy

[University Policy] When a student who is otherwise doing satisfactory work in a course is unable, for reasons beyond her/his control, to complete all course requirements during the term, that student will be given an “I” for incomplete. Such incompletes must be resolved by the student within one semester, except that an incomplete given in spring semester must be resolved by the end of the following fall semester. If it is not resolved within the time limit, the “I” (incomplete) is changed to “F” (failure) or “U” (unsatisfactory). See the FAQ on D2L for more information.

Project

A course project can be found on D2L. **This project will be turned in electronically through D2L.**

Quizzes & Homework

In addition to the suggested homework exercises out of the text (whose completion are indeed crucial to your success), several online quizzes will be given in this course. They do not require a proctor. “Walking” quizzes often mirror suggested exercises in the text (and are often cited on the quiz). “Jogging” quizzes are usually problems that test the same concepts, but in a different context. Practice quizzes and exams are also given in order to help you better prepare for the proctored exams. Practice quizzes and exams **do not count** towards your grade.

Exams

There will be five (5) **proctored** exams in this class (9 if you decide to take these in two parts). There will be a comprehensive proctored final and four proctored chapter exams (each will cover two chapters). Calculators will be allowed (in fact, necessary) on the exams. See the FAQ or contact Continuing Studies (scsu_online@stcloudstate.edu) to learn more about the process for finding a proctor.

Grades

Final grades will be determined using the following criteria:

Proctored Chapter Exams (4)	100	points each
Proctored Final Exam	150	points
Syllabus Quiz	5	points
Walking Quizzes	120	points
Jogging Quizzes	120	points
Project	40	points
Total	835	points

Though I will use my best professional judgement in determining grades, grades (with shades on the appropriate edges) will likely breakdown as follows:

85-100%	A
72.5-85%	B
60-72.5%	C
50-60%	D

In order to pass the course (with a D- or better), you will also need to pass (50% or better) at least one of the five proctored exams .