

Mathematics 2100 Syllabus

Fall 2013

Prerequisite: Math 1710 and it is recommended that Math 1720 be taken concurrently

Course Description/Overview: In this course, you will engage in explorations and lab activities designed to strengthen and expand your knowledge of the topics found in secondary mathematics. Course activities are designed to have you take a second, deeper look at topics you should have been exposed to previously; illuminate the connections between secondary and college mathematics; illustrate good, as opposed to typically poor, sometimes counterproductive, uses of technology in teaching; illuminate the connections between various areas of mathematics; and engage you in serious (i.e., non-routine) problem solving, problem-based learning, and applications of mathematics.

The course consists of three units: 1) Functions, 2) Modeling, and 3) Overlooked Topics and Explorations. Although it is convenient to divide the topics among these units, many topics will appear in more than one of these units. Specific topics of investigation include function properties and patterns, complex numbers, parametric equations, polar equations, vectors and counting techniques. Explorations involve the use of multiple representations, transformations, data analysis techniques (such as curve fitting) and interconnections among topics in algebra, analytic geometry, statistics, trigonometry, and calculus. The lab investigations include use of various technologies including computers, calculators, and computer graphing software.

Course Objectives: By the end of the semester, students will have

- Demonstrated proficiency in working with the concept of function and function related topics such as rate of change, injective functions and surjective function
- Demonstrated a depth knowledge of secondary mathematics topics such as parametric equations, polar coordinates, matrices, and vectors
- Demonstrated proficiency at creating data models using regression, matrices, and function patterns
- Presented mathematical ideas and topics in an effective manner
- Demonstrated proficiency in the use of technology in the mathematics classroom
- Identified content connections between various levels and various topics within levels of secondary and university level mathematics

Book: No book. Material will be given out in class. Each student should have a three ring binder for this class to collect the handouts. At the end of the semester, your three ring binder will essentially be the book. A TI 83 or 84 is optional, but if you have one, bring it to class.

Professor: Neal Brand, email address neal@unt.edu, office phone 940-565-4138

Office Hours: GAB 417B M 2:30-3:50, T 10:00-11:50, W 8:30-9:50, F 12:30-2:00 and by appointment.

Please use these hours to ask questions of your instructor. Do not just drop in at other times since your instructor will most likely be busy with other responsibilities. If you need to see your instructor at another time, make an appointment in advance.

Grading: Grades are based on three regular exams, homework, one project, attendance, participation and a final exam. The homework is worth a total of 300 points. The project is worth 100 points. Each regular exam is worth 100 points and the final exam is worth 200 points. A maximum of 50 points will be awarded for participation. Finally, attendance will count as 50 points or perhaps MORE! Each student starts with 50 points toward attendance. For each unexcused absence, 10 points will be deducted. This gives you a total of 1000 possible points. To earn an A it is sufficient to make a total of 900 points, 800 for a B, 700 for a C, and 600 for a D. You must also complete the on-line course evaluation as described below.

Course Evaluation: The SETE website will be open later in the semester for you to evaluate the course (dates to be announced later). You are required to go to the web site and complete an evaluation of the course sometime during the open period. Although your instructor will receive a list of who completed the evaluation forms before grades are turned in, he will not receive any other information about the evaluations until after the grades are turned in. Your instructor will receive no information that would link you to your specific answers or comments. The university, the mathematics department, and your instructor take your course evaluation input very seriously.

Regular Exams: The regular exams will be given in class, most likely on February 13, March 13 and April 22. The final exam is scheduled to be held in the classroom on May 8 (Wednesday) at 10:30.

Homework: Homework will be assigned from handouts. The assignments will be posted on the web. You are expected to turn in neatly written homework that shows all essential work. If the grader has trouble reading the homework, then the homework will be returned with a zero. Homework is to be turned in at the start of class on the day indicated on the web page or stated in class. Late homework will normally not be accepted.

Web Page: From the UNT home page follow through the links through the College of Arts and Sciences, the Mathematics Department and Neal Brand's home page to find the Math 2100 home page. You will find homework assignments, and other information concerning this class at that site. The URL is math.unt.edu/~brand/class/2100/2013Spring/2100.html.

Attendance: Since the material covered in this class is somewhat non standard and class participation is a key component to this class, it is essential that you come to class

every day. As indicated in the grading section, ten points will be deducted from your point total each time you miss class. If you absolutely are unable to come to class due to an illness or other unavoidable circumstances, then let your instructor know as soon as possible and ask for an excused absence.

Participation: You are expected to actively participate in classroom activities. Class time is not a time to socialize, but a time to work on mathematics in a group setting - there is a difference! During labs or explorations, you are expected to work with your group to contribute to solutions to the posed problems. You are also expected to participate in classroom discussions and to occasionally present solutions to explorations and labs. Listening to music, texting, browsing the web (for topics not related to the class) and other activities not directly related to the official class activity are not allowed. Active participation in the class is particularly important for success.

Extra Credit: Do not expect to be able to do extra credit work to help your grade either before or after the final exam. There will be no extra credit for this course other than perhaps an extra problem on an exam. Please do not ask for extra credit work to help your grade. Your best bet to help your grade is to do the required work at the time it is assigned.

Disabilities: The University of North Texas makes reasonable academic accommodation for students with disabilities. Students seeking accommodation must first register with the Office of Disability Accommodation (ODA) to verify their eligibility. If a disability is verified, the ODA will provide you with an accommodation letter to be delivered to faculty to begin a private discussion regarding your specific needs in a course. You may request accommodations at any time, however, ODA notices of accommodation should be provided as early as possible in the semester to avoid any delay in implementation. Note that students must obtain a new letter of accommodation for every semester and must meet with each faculty member prior to implementation in each class. For additional information see the Office of Disability Accommodation website at <http://www.unt.edu/oda>. You may also contact them by phone at 940.565.4323.

Cheating: No cheating will be tolerated. Cheating includes receiving help from anyone or anything that is not specifically allowed on an exam, project or final exam. On the other hand, you are encouraged to work together on the regular homework assignments as long as everyone participates and no one just copies the answers from someone else. Anyone caught cheating will receive an F for the course. Furthermore, a letter will be sent to the appropriate dean. I expect no cheating in this class. See <http://www.unt.edu/csrr> for more information.

Last Comment: Anything on this syllabus is subject to change at the discretion of the instructor.

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Math 2100

Spring 2013

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Schedule

- **January 14**
Begin Unit 1: Functions
[Definition of a Function](#)
- **January 16**
[Counting Functions](#)
- **January 23**
[Finish Exploration Counting Functions.](#)
[Exploration: Complex Roots and the Quadratic Function](#)
- **January 28**
[Homework due today](#)
[Lab: Qualitative Graphing Part 1](#)
[Lab: Qualitative Graphing Part 2](#)
- **January 30**
Finish Qualitative Graphing – Present Remaining Solutions to [Lab: Qualitative Graphing Part 2](#) from Monday
Discuss shape of sine and cosine graphs
Start Conic Sections
[Analytic Definitions of Conic Sections](#)
[Parabola Graphing](#)
[Ellipse and Hyperbola Graphing](#)
[Homework Due](#)
[Unit Homework 1](#) Due February 6
- **February 4**
Continue Conic Sections
[Exploration: Conic Sections](#)
Look for how conic sections are used and be prepared to share what you have learned next time
- **February 6**
Complete Conic Sections
Turn in [Unit Homework 1](#)

- **February 11**
[Lab: Spring Mass Motion](#)
[Turn in Conic Section Homework](#)
- **February 13**
Exam 1
- **February 18**
 Turn in [cosine homework](#).
[Sequences](#)
- **February 20**
[Difference Column Exploration](#)
- **February 25**
[Function patterns](#)
[Verifying Function Patterns](#)
[Plain Graph Paper](#)
[Log Graph Paper](#)
[Unit 1 Assignment 2](#) Due March 14
- **February 27**
 Exploration: [Function Patterns Application](#)
- **March 5**
Begin Unit 2: Modeling
[Terminal Velocity Lab](#) – Read the lab handout before class and bring a digital camera to class. Instead of going to our classroom, to go the 4th floor of GAB and we will meet just outside the math office.
- **March 4**
 Exploration: [Thunderstorm Data Regression](#)
[Midterm Project](#)
- **March 6**
 Exploration: [Residual Plots](#)
 Homework: [Stabilizing wood](#) due on March 26
- **March 11**
[Finding the Inverse of Matrix Using an Augmented Matrix](#)
[Exploration: Using Matrices to Model Equations](#)
[Unit 1 Assignment 2](#) Due today
- **March 13**
Exam 2
- **March 25**
[Exploration: Using Matrices to Model Equations](#)
[Stabilizing wood](#) due today
- **March 27**
[Modeling using piecewise defined functions \(Roller Coaster\)](#)
- **April 1**
Begin Unit 3: Overlooked Topics
[Parametric equations and vectors](#)
[Exploration: Extra Parameter Problems](#)
- **April 3**
 More parametric equations and vectors

[Exploration: Extra Parameter Problems](#)
[Major Homework Assignment 3](#)

- **April 8**
Finish parametric equations and vectors
[Vector force table lab](#)
- **April 10**
[Polar coordinates](#)
- **April 15**
Midterm Project Due
[Major homework Assignment 3 Due](#)
- **April 17**
Review for Exam 3
- **April 22**
Exam 3
- **April 24**
[Tiger Weeds Golf Shot](#)
- **April 29**
Review
- **May 1**
[Review](#)
- **May 8**
Final Exam (10:30)

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