Mathematics 2100 Syllabus - Spring 2011

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 four units: 1) Functions, 2) Modeling, 3) Overlooked Topics and Explorations, and 4) Geometry of Complex Numbers. Specific topics of investigation include function properties and patterns, complex numbers, parametric equations, polar equations, and vectors. 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, vectors, and complex numbers
- 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 for the class. 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 2:30-3:30, T 1:30-2:30, W 3-4:30, Th 2:00-3:30 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 16, March 28 and April 25. The final exam is scheduled for May 11 (Wednesday) at 10:30 in the classroom.

**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 1720 home page. You will find homework assignments, and other information concerning this class at that site. The URL is [http://www.math.unt.edu/~brand/class/2100/2011Spring/2100.htm](http://www.math.unt.edu/~brand/class/2100/2011Spring/2100.htm).

**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. 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. 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:** It is the responsibility of students with certified disabilities to provide the instructor with appropriate documentation from the Dean of Students Office.

**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.

**Last Comment:** Anything on this syllabus is subject to change at the discretion of the instructor.
Math 2100
Spring 2011

Syllabus

Schedule

- **January 19**
  - Begin Unit 1: Functions
    - A common Cube Conundrum
- **January 24**
  - Functions
    - Definition of a Function
- **January 26**
  - Types of function
- **January 31**
  - Exploration: Complex Roots and the Quadratic Function
- **February 2**
  - Qualitative Graphing
- **February 7**
  - Conic Sections
- **February 9**
  - More Conic Sections
- **February 14**
  - Lab: Spring Mass Motion
- **February 16**
  - Exam 1
- **February 21**
  - Sequences, difference patterns
- **February 23**
  - Continue Difference Column exploration
- **February 28**
  - Function patterns
- **March 2**
  - Function pattern applications
- **March 7**
  - Begin Unit 2: Modeling
    - Regression
- **March 9**
  - Residual Plots
- **March 21**
  Terminal Velocity Lab
- **March 23**
  Using matrices to find models
- **March 28**
  Exam 2
- **March 30**
  Modeling using piecewise defined functions (Roller Coaster)
- **April 4**
  Begin Unit 3: Overlooked Topics
  Parametric equations and vectors
  Vector force table lab
- **April 6**
  More parametric equations and vectors
- **April 11**
  Finish parametric equations and vectors
- **April 13**
  The golf shot, combining ideas from previous lessons
- **April 18**
  Polar coordinates
- **April 20**
  More polar coordinates
- **April 25**
  Exam 3
- **April 27**
  Begin Unit 4: Geometry of Complex Numbers
  Geometry of complex numbers
- **May 2**
  Implication of the geometry of complex numbers
- **May 4**
  Review
- **May 11**
  Final Exam (10:30)