Syllabus: MTH 140 Pre-Calculus

Fall 2012, Sections 001/002

Instructor: Dr. Keith Hubbard
Class Times & Place: Sec 001 – M-F 10-10:50, Math 211
E-mail address: hubbardke@sfasu.edu
Sec 002 – M-F 11-11:50, Math 211
Department: Mathematics & Statistics
Office Hours: Mon & Fri 8-10
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Office Location & Phone: Math 336, 936.468.1533

Required Materials
Students may also use a non-programmable, non-graphing calculator with no permanent memory.

Course Description
Preparatory for the calculus sequence: properties and graphs of algebraic, exponential, logarithmic, and trigonometric (with inverses); fundamental trigonometric identities, conic sections, polar and rectangular coordinate systems.
Prerequisites: See General Course prerequisites.

Final Grade Components
You will get a choice how you will be graded this semester. While homework and examinations will definitely affect your grade, you will be able to choose whether quizzes toward you final grade and whether presenting problems digitally will be a part of your work. You will also get to choose what kind of outside math or science activities you participate in. However, you must commit in writing to the grading scheme you would like to be evaluated on by the end of the second week of class (September 7). From that point on, just as you must adhere to the syllabus of a course, you are committed to the grading scheme you have selected.

Here are the 4 options from which you may select:

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Examinations, Grading and Make-up Policies
- Exams are Sept 21, Oct 19, and Nov 20. The final exam will be held 10:30-12:30 on Dec 12 (Sec 1) or Dec 13 (Sec 2).
- If you miss an exam and have a valid excuse, I will replace your missed test grade by your final exam grade. However, your final may only replace one other score.
- Attendance Policy: Over 3 unexcused absences may result in a grade reduction.
- Since you have a full semester to arrange any travel plans, they are not an excuse for missing the final.
- Students are expected to attend every class meeting, arriving on time. If you have 3 or less absences and score a 70% or better on the final, I may replace your lowest test grade. If a student leaves class early without permission, the student may be marked absent.
- It is important to develop the view that there is more to your academic experience than just the classroom. To assist in this, you will be encouraged to attend outside lectures and club meetings in the College of Science and Mathematics, especially the annual Texas Undergraduate Mathematics Conference on October 26 & 27. This course requires that you attend of one such event and submit a ½ page summary prior to the first exam, and another such even between the first and second exams, again submitting a ½ page summary prior to the second exam. If you document attendance at a third event, you will receive full credit to replace your homework score. You may want to visit [http://cosm.sfasu.edu/index.aspx?URL=CollegeCalendar](http://cosm.sfasu.edu/index.aspx?URL=CollegeCalendar) to look for events.
- You may get help on work that is assigned to be done outside of class, unless otherwise instructed, but I expect any work that you turn in to reflect your understanding of the material. On in-class graded work, I expect you to only use your brains, pencil, paper, and, sometimes, a calculator.
**General Policies and Information**
- Homework will also be assigned from our textbook for your personal study.
- Quizzes will take place the last 10-15 minutes at the end of every non-exam week. (There may occasionally be additional quizzes.)
- I will send e-mails to the entire class during the semester. Check your SFA e-mail account frequently. My website lists daily assignments and other useful information.
- To contact me, you may call my office, drop by my office, or e-mail me. I will do my best to reply quickly.
- Students are expected to respect the learning environment of their fellow students. To this end, use of mobile phones, mp3 players, PDAs, etc., is forbidden during class.
- Rachel McCarter will hold SI study sessions Tuesday and Thursday at 6pm in Room N of the AARC.

**Tips for a Successful Math Class**
- Measure success as understanding and being able to do new problems, not as having completed the assignment.
- Try to understand definitions and solving approaches. See if you can find examples that work and examples that don’t.
- Take the time to read the book and review your notes.
- Practice homework problems until you can do it without referring to examples or help from your notes.
- Practice explaining big ideas and problem solving procedures in your own words, using complete sentences.
- Have someone check your work after you have finished it to help eliminate mistakes that you do not know you are making.
- Treat mistakes as a learning experience.
- Realize that math is hard. Some parts are harder for some people than others. Ph.D. mathematicians frequently find it hard to learn new things sometimes and make mistakes on things we already know. We have just learned to go back and refresh the basics, and keep working, even it takes hours, days, weeks, or years.
- Some people take longer to understand things than others. Evaluate how you study and seek to study smarter, not necessarily longer. If you are still stuck, get some help. The AARC and I are here for you!
Student Learning Outcomes
At the end of MTH 140, a student who has studied and learned the material should be able to:

- Define "function".
- Recognize basic functions (including transcendental functions) algebraically and graphically.
- Identify determining factors of the graph of a function either algebraically or from the graph, including the domain and range, intercepts, asymptotes, and end behavior.
- Generate composite functions and identify domains/ranges.
- Define and recognize when a function is one-to-one and explain why this is necessary for a function to have an inverse.
- Compute the inverse of a function and understand that the domain may need to be restricted in order to do so.
- Define triangular/circular trigonometric functions.
- Determine the domains/ranges/graphs of circular trigonometric functions and their transformations.
- Identify special triangles and values of the trigonometric functions at the standard multiples.
- Extend the definition of the trigonometric functions and the Pythagorean Theorem to obtain the reciprocal, quotient, and Pythagorean identities.
- Understand the sum and difference formulas and use them to generate the double- and half-angle formulas.
- Restrict the domain of the trigonometric functions so that the inverse trigonometric functions may be defined.
- Solve trigonometric equations.
- Use Law of Sines/Cosines to solve triangles.
- Recognize that the distance formula is an application of the Pythagorean Theorem.
- Define and analyze the conics: circles, ellipses, parabolas, and hyperbolas.
- Convert the polar equation of a conic to a rectangular equation and vice versa.
- Solve basic systems of equations.

General Exemplary Educational Objectives
All general education mathematics sequences in the state of Texas should equip students:

- To apply arithmetic, algebraic, geometric, higher-order thinking, and statistical methods to modeling and solving real-world situations.
- To represent and evaluate basic mathematical information verbally, numerically, graphically, and symbolically.
- To expand mathematical reasoning skills and formal logic to develop convincing mathematical arguments.
- To use appropriate technology to enhance mathematical thinking and understanding and to solve mathematical problems and judge the reasonableness of the results.
- To interpret mathematical models such as formulas, graphs, tables and schematics, and draw inferences from them.
- To recognize the limitations of mathematical and statistical models.
- To develop the view that mathematics is an evolving discipline, interrelated with human culture, and understand its connections to other disciplines.

Course Outline & Approximate Time Spent
- Functions 30% of course
  - Definition/notation
  - Domains/ranges of basic functions, their graphs, and topics appropriate to each type of function:
    - Linear functions: constant functions; slope; point-slope/slope-intercept form; solving linear equations/inequalities
    - Power functions: end behavior
    - Polynomials: intercepts, maximum/minimum number of turning points, and end behavior; solving polynomial equations/inequalities (factoring, Zero Product Principle, quadratic formula)
    - Rational functions: horizontal, vertical, and oblique asymptotes; polynomial long division and proper rational functions, end behavior
    - Exponential functions: properties of exponents (including, especially, rational exponents); asymptotes and end behavior; exponential growth/decay; natural exponential
    - Logarithmic functions: properties of logarithms; asymptotes and end behavior; natural logarithms; solving exponential/logarithmic equations
    - Piecewise-defined: common piece-wise defined functions (absolute value, stamp-price, etc.); graphing/interpreting piecewise-defined functions; 'skip' and 'jump' discontinuities
  - Transformations of the basic graphs: translations, reflections, and compressions/expansions
  - Combining functions: algebraically and by composition
  - Inverses of functions (including those that require branches, like the principal square root)
• Trigonometry 40% of course
  o Triangular/circular functions
    ▪ Definitions in both contexts
    ▪ Special triangles and values of the trigonometric functions at the standard multiples
    ▪ Graphs, domains/ranges, asymptotes, and transformations of the circular functions
  o Trigonometric Identities
    ▪ Basic: reciprocal, quotient and Pythagorean identities
    ▪ Others: sum/difference identities, double- and half-angle identities
  o Inverse trigonometric functions
    ▪ Domains/ranges, reference angles
  o Graphs
  o Solving trigonometric equations
  o Law of Sines and Cosines

• Analytic Geometry 30% of course
  o Cartesian coordinate system/distance formula
  o Conic sections: parabola, ellipse, hyperbola
  o Transformations (including rotations)
  o Polar coordinates
  o Systems of equations

**University Policies**

- **Academic Integrity (A-9.1)** Academic integrity is a responsibility of all university faculty and students. Faculty members promote academic integrity in multiple ways including instruction on the components of academic honesty, as well as abiding by university policy on penalties for cheating and plagiarism.

  **Definition of Academic Dishonesty** Academic dishonesty includes both cheating and plagiarism. Cheating includes but is not limited to (1) using or attempting to use unauthorized materials to aid in achieving a better grade on a component of a class; (2) the falsification or invention of any information, including citations, on an assigned exercise; and/or (3) helping or attempting to help another in an act of cheating or plagiarism. Plagiarism is presenting the words or ideas of another person as if they were your own. Examples of plagiarism are (1) submitting an assignment as if it were one's own work when, in fact, it is at least partly the work of another; (2) submitting a work that has been purchased or otherwise obtained from an Internet source or another source; and (3) incorporating the words or ideas of an author into one's paper without giving the author due credit. Please read the complete policy at [http://www.sfasu.edu/policies/academic_integrity.asp](http://www.sfasu.edu/policies/academic_integrity.asp)

- **Withheld Grades Semester Grades Policy (A-54)** Ordinarily, at the discretion of the instructor of record and with the approval of the academic chair/director, a grade of WH will be assigned only if the student cannot complete the course work because of unavoidable circumstances. Students must complete the work within one calendar year from the end of the semester in which they receive a WH, or the grade automatically becomes an F. If students register for the same course in future terms the WH will automatically become an F and will be counted as a repeated course for the purpose of computing the grade point average.

  The circumstances precipitating the request must have occurred after the last day in which a student could withdraw from a course. Students requesting a WH must be passing the course with a minimum projected grade of C.

- **Students with Disabilities** To obtain disability related accommodations, alternate formats and/or auxiliary aids, students with disabilities must contact the Office of Disability Services (ODS), Human Services Building, and Room 325, 468-3004 / 468-1004 (TDD) as early as possible in the semester. Once verified, ODS will notify the course instructor and outline the accommodation and/or auxiliary aids to be provided. Failure to request services in a timely manner may delay your accommodations. For additional information, go to [http://www.sfasu.edu/disabilityservices/](http://www.sfasu.edu/disabilityservices/).

- **Acceptable Student Behavior** Classroom behavior should not interfere with the instructor’s ability to conduct the class or the ability of other students to learn from the instructional program (see the Student Conduct Code, policy D-34.1). Unacceptable or disruptive behavior will not be tolerated. Students who disrupt the learning environment may be asked to leave class and may be subject to judicial, academic or other penalties. This prohibition applies to all instructional forums, including electronic, classroom, labs, discussion groups, field trips, etc. The instructor shall have full discretion over what behavior is appropriate/inappropriate in the classroom. Students who do not attend class regularly or who perform poorly on class projects/exams may be referred to the Early Alert Program. This program provides students with recommendations for resources or other assistance that is available to help SFA students succeed.