

MATH 171

Elementary Functions

Description

Study of algebraic, exponential, logarithmic, and trigonometric functions; their graphs, properties, and applications

Prerequisites

MATH 099 or math placement score corresponding to an ACT Math score of 22. Students in this course typically have a solid grasp of arithmetic and basic algebraic manipulations (factoring/expanding polynomials, solving equations). Typical freshmen in this course have successfully completed 3 years of math in high school (through Algebra II or equivalent). No prior experience with graphing calculators is assumed

Materials

Textbook: Precalculus: An Investigation of Functions (edition 1.3)

Authors: Lippman, D. & Rasmussen, M

Available for free at: <http://www.opentextbookstore.com/precalc/>

Graphing Calculator

Activities: Blackboard or www.bradthiessen.com

Student Learning Outcomes

Course outcomes

- Express functions in words, graphs, tables, and formulas
- Apply functions to model situations and solve problems
- Transform basic functions into new functions

General Education outcome

- Students in this course develop fundamental (quantitative) skills and knowledge necessary to flourish in a rapidly changing world.

(90 specific learning objectives available on course website)

Attendance policy:

Because in-class activities cannot be fully reproduced outside of class, it is important that you attend class and arrive on-time. While I will not deduct points from your grade for absences, students with poor attendance generally do poorly in this class.

If you must miss class, I'd appreciate it if you let me know in advance. You **must** get approval before missing exams.

Policy on the use of electronic equipment:

Calculators (and computers) will be used extensively in this course. Out of courtesy to other students, please turn off the volume on any device you have.

Academic integrity policy:

I encourage you to collaborate when studying or completing assignments, activities, homework, or projects.

You must work alone on exams!

Review the SAU policy at <http://web.sau.edu/Registration/documents/AcademicIntegrityPolicy.pdf>

Accommodations policy:

Students with disabilities who believe they may need accommodations in this class are encouraged to contact the Office of Services for Students with Disabilities at 333-6275 as soon as possible to better ensure that such accommodations are implemented in a timely fashion.

Fall 2013
Ambrose 413-B
T/R 5:10-6:25

Instructor:
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Course procedures and expectations:

This course introduces students to elementary functions, which we'll use to model phenomena and solve problems. Through an emphasis on conceptual understanding and problem solving, students will learn how to construct mathematical models from data in the social and natural sciences. This course also prepares students for Calculus.

We will begin each lesson by modeling real (or realistic) data via elementary functions. We will then use our models to solve problems. Through question-and-answer sessions and guided problem solving, we will apply our skills to model novel situations.

This course does not place a great emphasis on symbolic manipulations. Instead, we will focus on solving problems through a variety of graphical and analytical approaches. To check your understanding, I may ask groups of students to solve problems in front of the class. The purpose of this is not to embarrass you – I want you to gain experience solving problems and explaining your solutions. I encourage students to work together on assigned problems and share class notes, but make sure you are able to solve the problems on your own.

Before each class, I recommend you skim through the corresponding section from your textbook. This will enable you to get more from each class period. During class, I ask that you take notes and actively participate by asking and answering questions. Do not be overly concerned if you answer a question incorrectly during class – just make sure you learn the material before the scheduled exams.

After class, I recommend that you solve all the assigned problems from the textbook. I only assign odd-numbered problems, so you'll be able to check your answers immediately. If you cannot solve a problem, we can work together to solve it during the next class. Also, feel free to visit my office during office hours or send me an email with any problems you have.

At the end of each unit, you will take a test to demonstrate your mastery of the course objectives. While test questions will not look identical to the assigned homework problems, the questions will only cover the learning objectives listed at the end of this syllabus. You will only be tested over material covered in class.

Do I need to buy the textbook?

To save you money, I've chosen a textbook that is available online (for free). You can also choose to buy a hard copy for less than \$20.

At a minimum, I recommend completing the recommended exercises from the textbook. If you cannot solve any problem, go back and read the textbook section for additional help.

Do I need to do the homework?

I purposefully selected homework exercises to help you practice the content we will cover in class. I strongly recommend you work through the exercises to assess your understanding. You do not need to complete the homework exercises to succeed in this course, though. If you choose not to complete homework exercises, your exam scores will count for more of your grade. In recent semesters, students completing homework exercises have outperformed other students.

What grade should I expect?

Here's the distribution of grades from the last 6 semesters I've taught this course:

29% = A
32% = B
16% = C
4% = D
18% = F
1% = WF

Assessment and Grading:

Your grade in this class will reflect the degree to which you master the course outcomes by the end of the semester. To evaluate your performance, I will use evidence from exams, assignments, and homework exercises you complete.

We will separate this course into four (overlapping) units:

- (1) Functions and linear functions
- (2) Exponential/Logarithmic functions
- (3) Polynomial/Rational functions
- (4) Trigonometric functions

Throughout each unit, you will be given several opportunities to complete **assignments** I designed to help you evaluate your understanding. Because of this purpose, I will not grade these assignments for correctness. Instead, upon turning-in an assignment, I will award you credit for completion and we will review the solutions.

Another way to check your understanding throughout each unit is by completing **homework exercises**. The schedule identifies recommended homework problems from the textbook. As you'll notice, I try to assign only exercises that have solutions in the textbook. Because of this, we may not spend any time in class reviewing homework exercises. Instead, you will be expected to check your work and seek assistance outside of class if needed.

A third way I will evaluate your performance is through **unit exams**. Exams will assess your ability to express, apply, and transform elementary functions. Typically, I give unit exams with both in-class and take-home components

While I strongly recommend you complete assignments and homework exercises, you are only required to complete the unit exams. If you choose not to complete assignments or homework exercises, your grade will not be penalized. Instead, your unit exam scores will count for a greater percentage of your overall grades.

Depending on the work you decide to do, I will calculate your unit scores with the following weights:

	Complete Everything	No Homework	No homework/assignments
Unit Exam	75%	85%	100%
Assignments*	15%	15%	----
Homework	10%	----	----

* Assignments may include in-class quizzes or take-home projects

To calculate your final grade, I will average your unit scores and use the following grading scale:

A (100-90%) B (90-80%) C (80-70%) D (70-60%) F (60-0%)

Extra Credit & Reassessment:

As we work through the in-class activities, I may think of novel mini-projects to extend your learning. Any extra credit opportunities you complete will reduce the weight of the exam on your unit grade.

Instead of a single comprehensive final exam, I will create new exams for each of the 4 units we covered during the semester. If your score(s) on any unit exam(s) did not meet your expectations, you can choose to take the new exam(s) during our scheduled final exam time. Your score on the new exam(s) will replace your original score on the unit exam(s)

Week	Topics/Activities	Assignments - Students present answers to <u>underlined</u> items
8/22	Review syllabus, course objectives. Introductions. Prerequisite skills. What are elementary functions? What is mathematical modeling?	<ul style="list-style-type: none"> • Purchase course materials • Complete math attitudes survey
8/27	Activity #1: Introduction to Functions	<ul style="list-style-type: none"> • 1.1: 1, 5, 9, 17, 19, 31, 37, 40, 47, <u>48</u> • 1.2: 5, 7, 11, 17
8/29	Activity #2: Linear functions	<ul style="list-style-type: none"> • 2.1: 1, 5, 27, 33, 37, 43, <u>49</u> • 2.2: 1, 9, 25, 27, 41, 45, 49
9/3	Activity #3: Fitting linear functions to data	<ul style="list-style-type: none"> • 2.3: 1, 3, 5, 7, 19 • 2.4: 3, 7, 13, 14
9/5	Activity #5: Transformations of functions	<ul style="list-style-type: none"> • Complete regression activity
9/10	In-class graphing activity	<ul style="list-style-type: none"> • 1.5: 11, 13, 17, 19, 33, 51, 53, <u>75-86</u>
9/12	Finish unit 1 activities and present homework problems	<ul style="list-style-type: none"> • Complete graded graphing activity
9/17	Review functions, linear functions, linear regression, and linear systems	<ul style="list-style-type: none"> • Complete all unit 1 assignments • Turn in any completed homework or assignments
9/19	Unit 1 exam	<ul style="list-style-type: none"> • 1.4: 5, 7, 9, 15, 17, 21, 23, 27, <u>34</u>, 35, 37 • 1.6: 7, 9, 13, 17, 23 • 4.1: 7, 9, 11, 13, 23, 25, 33, 35 • 4.2: 7-10, 17, 19
9/24	Activity #6: Composition of functions, Inverse functions	<ul style="list-style-type: none"> • 4.3: 3, 11, 21, 23, 49, 65, 67, 69 • 4.6: <u>1</u>, <u>3</u>, <u>7</u>, <u>9</u>, <u>13</u>, <u>17</u>, <u>19</u>, <u>34</u>, <u>39</u> • 4.7: <u>13</u>, <u>14</u>, <u>15</u>, <u>16</u>
9/26	Activity #7: Exponential functions	
10/1	Activity #8: Exponential, Logarithmic, Logistic functions	
10/3		
10/8	Review exponential, logarithmic, logistic functions	<ul style="list-style-type: none"> • Complete all unit 2 assignments • Turn in any completed homework or assignments
10/10	Unit 2 exam	
10/15	Activity #9: Polynomial functions	
10/17	Activity #10: Quadratic functions	
10/22	Activity #11: Rational functions	<ul style="list-style-type: none"> • 3.1: 17, 19, 21, 23, 25, 29, 31 • 3.3: 7, 9, 31, 33, 35, 37, 41 • 3.2: 1, 3, 7, 17, 19, 21, 27, <u>31</u>, <u>33</u>, <u>35</u>, <u>37</u>
10/24	Review quadratic, polynomial, and rational functions	
10/29	Unit 3 exam	<ul style="list-style-type: none"> • 3.4: 5, 9, 11, 13, 15, 19, 21 • 3.5: <u>22</u>, <u>23</u>
10/31	Activity #12: Choosing and evaluating mathematical models	
11/5	Activity #13: Periodic functions & Distance	<ul style="list-style-type: none"> • Complete all unit 3 assignments • Turn in any completed homework problems • Complete modeling project (Activity #12.5)
11/7	Activity #14: Trigonometric functions	
11/12	Activity #15: Inverse trigonometric functions	<ul style="list-style-type: none"> • 5.1: 1, 17 • 5.2: 3, 5, 31 • 5.3: 1, 3, 5, 7, 13 • 5.4: 1, 7, 11
11/14		
11/19	Review trigonometric functions	<ul style="list-style-type: none"> • 6.1: 1, 5, 13, 21, 23 • 6.3: 1, 13, 15, 21 • 6.4: <u>7</u>, <u>9</u>, <u>11</u>, <u>15</u>, <u>17</u>, <u>19</u>
11/21	Unit 4 exam	
11/25	Thanksgiving Break - No class	<ul style="list-style-type: none"> • Complete all unit 4 assignments • Turn in any completed homework or assignments
11/29		
12/3	Activity 16: Preview of Calculus and higher-level math.	<ul style="list-style-type: none"> • Decide which unit exams you will re-take during the final exam time.
12/5	Review elementary functions	

Final

Exam Scheduled: _____