Class Syllabus

MATH 1410, Elementary Functions, Sam Houston State University

Fall 2017, Section 09, CRN 81039, ONLINE

WebAssign key: shsu 0043 3542

Dr. Ken W. Smith

Welcome to our online precalculus class!

1 An important course!

The concepts of calculus created modern science and revolutionized the world! Calculus is fundamental to modern science and calculus, in turn, is founded on a solid understanding of elementary functions.

Elementary functions are the functions which occur in most of calculus and basic math applications. They include polynomial functions, rational functions, trigonometric functions, exponential functions and their inverse functions, including the inverse trig functions and logarithms, along with functions created by composing a sequence of elementary functions. Almost *every* function appearing in scientific or economic applications is an elementary function.

In this course we will focus on understanding these functions and successfully manipulating them (with the appropriate algebra techniques) in preparation for a successful transition into calculus.

2 Success in Calculus

This course has *one* objective – to prepare you, the student, for *success in calculus*. At many universities, less than half of the students in a calculus class get a C or better. Sadly, this was true at Sam Houston, as of 2012. Many students in the first calculus course do not have the prerequisite understanding of elementary functions (and algebra) and so end up taking the calculus course several times. With this class, MATH 1410, Elementary Functions, first introduced in 2011, we hope to change that. You should plan on making an A or a B in this class and then moving on in the following semester to MATH 1420, Calculus 1, and continuing to be successful, with A or B grades!

Course objectives:

Students completing this course will be able to:

1. Use function notation and recognize functions as a fundamental mathematical concept.
2. Work with composition of functions.
3. Recognize one-to-one and onto functions and compute the inverse of a function.
4. Use simple graphing techniques to understand the shape of a function.
5. Solve equations involving polynomial and rational functions.
6. Solve equations involving exponential and logarithmic functions.
7. Work with elementary functions on the unit circle to solve equations involving trig functions.
8. Work with inverse trigonometric functions.

Prerequisites. Students entering this course should be comfortable with elementary algebra and intermediate algebra, function notation, linear equations, and factoring quadratic equations.

3 Course Mechanics

Textbook. A set of Lecture Notes by Dr. Ken Smith are available on Google Drive. We will cover the following materials, in separate folders on Google Drive (click on the link):

1. Functions
2. Polynomials
3. Exponentials and Logs
4. Trig Intro
5. Advanced Trig

A supplemental textbook for this class is available for free online, in web view and PDF format. (On can use a number of different formats. Web view is recommended – the responsive design works seamlessly on any device.) The textbook is Precalculus from OpenStax, ISBN 1938168348 (follow the link.)

We will also use online exercises created on *WebAssign*. The WA course key for this class is given at the top of this syllabus. To register for *WebAssign*, go to www.webassign.net, click on the "Students" link and select "I Have a Class Key". Insert the class key (found at the top of this syllabus) and follow the instructions.

Registration for the *WebAssign* exercise set with this class costs about $30. The WebAssign exercise set, along with the free worksheets and lecture notes online, replace the original textbook for this class. That textbook cost students $160 in 2011 and is now over $250.[1]

Contact information. My e-mail address is KenWSmith@shsu.edu. Please feel free to contact me by email. My office is LDB 421E.

4 Reading, exercises and assignments

A successful study routine outside of class is important for success in MATH 1410 and is critical for success in calculus.

The regular outline for this class involves the following.

1. First watch video podcasts (taking notes on the material presented there) and complete the *WebAssign* (WA) exercises. The main concepts of the lecture will also be summarized in a class blog.
2. After completing the WA exercises students should then complete the worksheets which come with the class lecture.

In this online section, students should watch the podcasts and complete WebAssign on a **MWF** schedule (as if attending class.)

The worksheets are also due at 3 pm on class days. Completing the worksheets requires printing out the long form of the worksheets (with lots of blank space), working carefully through the problems, then either turning the worksheets into LDB 421E in person or scanning the completed worksheets and sending them to the graduate student assigned to this class.

We will use **Google Drive** and **Blackboard**. Daily materials is posted on both Google Drive and Blackboard. Daily class announcements will appear on the course Blackboard.

Students should check their campus email every day. Important course announcements will be given by email.

[1] That textbook, *no longer required*, is available on Amazon.prime for $255.20 (new); it would cost over $300 through the campus bookstore.

Course blog. Outlines of daily lectures will be discussed on a class blog sammycalculus.blogspot.com.

Video podcasts. Lecture notes and podcasts will be available on Google Drive or Blackboardand should be read/watched on a daily basis. Each lesson involves two to four short video podcasts, totaling 20 to 25 minutes. Students should listen carefully to the video lectures and take notes. Since the lectures are provided by video, it is useful to pause and rewind the notes at times, to enhance understanding.

WebAssign exercises. Along with the daily readings and podcasts, there will be some basic online exercises over the reading material. The *WebAssign* problems are merely *warm-up exercises*, to make sure that the online material has been read and that the terms and notations are understood. The *WebAssign* exercises prepare the student for the more advanced worksheets available on Google Drive.

WebAssign averages above 70% are required in order to take the mini-exams. (Many students will achieve a *WebAssign* average above 95% since it is possible to redo the *WebAssign* exercises up to 5 times.)

A minimum 70% average on *WA* is required prior to taking mini-exams and exams.

Class worksheets. Class worksheets are posted on Google Drive. There is one worksheet per lecture, three worksheets per week. (See the course schedule for more details.)

Students who do *just* the *WebAssign* exercises typically achieve only single digits scores on the 25-point mini-exams and so fail the class.

WA exercises are merely warm-up for the real material. The Worksheet homework is also important!

Please use the long form of the worksheets, with plenty of space to write answers. Completing the worksheets requires printing out the individual pages, working carefully through the problems, then scanning the completed worksheets and sending them to the instructor. This work should emphasize good mathematical style with correct use of equations and should display the steps required to reach a solution. After doing a worksheet, students should then access the worksheet solution set on Google Drive or Blackboard and check their work on odd-numbered problems, noticing both correct algebra steps and correct mathematical writing.

Worksheets are to be submitted by 3:00 pm on Mondays, Wednesdays and Fridays. Students who have access to the SHSU campus on a regular basis may turn in their homework in person, to the inbox to the left of my office door at LDB 421E. Students who do not have easy access to the SHSU campus may *scan*[2] their homework and email it me at KenWSmith@shsu.edu with a copy (cc) to the class graduate assistant, Salem Olajide, oso007@shsu.edu.

Please use the long form of the worksheets, with plenty of space to write answers.

Regular mini-exams. After watching the video podcasts, completing the *WebAssign* warm-up exercises and the daily worksheets, a student should be ready for the weekly 25-point mini-exam given every Monday.

It is difficult to set up online exams for mathematics classes where the emphasis is on correct worked out equations. For this reason, the four exams and all mini-exams will be proctored in a face-to-face environment. Students must take the mini-exams in a face-to-face environment on Mondays. Please set up an appointment to take those weekly exams in Lee Drain Building (LDB) on campus.

There are three exams plus a final exam. Most student will take the exams in a proctored environment in LDB on campus from 3 to 4:30 PM on the dates of the exams. Other times may be arranged in advance. Further details on the taking of mini-exams and exams will be given throughout the semester.

[2]Please do not photograph the homework! Scan the homework with a printer/scanner or with a smartphone app such as Evernote Scannable or Turboscan.

A separate class schedule, attached at the end of this syllabus, includes drop dates, mini-exam dates and exam dates.

5 Grades

A total of **1000** classroom points provide the course grade. A student who meets the class requirements and who achieves 88% (**880 points**) or higher will receive an *A* grade for the semester. A student who meets the class requirements and achieves at least 80% (**800 points**) will receive at least a B. Similarly 70% (**700 points**) gives a *C* grade. In order to receive a *D* grade, a student must achieve at least 65% (**650 points**.)

A grade of *C* or better in this class is required to continue on to calculus.

The 1000 points are accumulated as follows:

1. Daily work on *WebAssign* is worth **100 points**. WA exercises have a point value of their own. There are forty WA exercise sets, each worth twenty WA points, for a total of about 800 WA points at the end of the semester. These WA points are equivalent to 100 class points and so each WA point is worth about one-eighth of a point on an exam or mini-exam.)

2. Twenty-five **(25)** points is set aside for class participation. This includes involvement on the Blackboard discussion board or chat rooms and engagement with other students in activities such as the course Precalculus Trivia Ladder. (More details on this later.)

3. Daily work from *MATH 1410 worksheets* is worth **150 points**. The worksheets are an important part of the course. It is not possible to do well in this class without doing the lecture worksheets. Lecture worksheets are excellent preparation for mini-exams and exams.

4. Nine weekly mini-exams, 25 points each, give a possible **225 points**.

5. Three regular exams (**Sept 25, Oct 23, Nov 20**) are 100 points each, total **300 points**.

6. The Final Exam (**Dec 4**) is worth **200 points**.

Make-up policies. A student who misses a mini-exam due to illness or family emergency will be allowed to replace that *one* grade by a pro-rated percentage from the next exam.[3] (Students who do not miss a mini-exam will be allowed to use the next exam grade to replace their lowest mini-exam grade.)

Students may turn in ONE late homework worksheet for full credit. After that one time, all other late worksheets are graded for half-credit.

6 Miscellanea

On homework it is acceptable to receive tutoring from the instructor. Students are also encouraged to discuss the problems with other students. However, anything a student submits for grading must be in their own words, with their understanding of the material. To turn in material that is someone else's understanding or written in someone else's words is **plagiarism**.

On in-class exams or quizzes, all the work a student turns in must be their own, without any aid from anyone else. Giving or receiving aid on in-class quizzes and exams will be considered plagiarism (cheating.) The penalties for plagiarism will include at least a zero grade on the submitted material and most likely a failing (F) grade in the course with a referral to a disciplinary committee.

Further guidelines for classroom conduct (including absences on religious holy days) are available at http://www.shsu.edu/syllabus.

[3] For example, a grade of 80 of 100 on Exam 1 will allow a student to replace the *lowest* prior mini-exam grade with a score of 20 of 25 if needed.

Calculators. Calculators can be a great aid to mathematical computations but they can also act like a magic wand, providing answers *without understanding*. In this course we will emphasize the *understanding* of mathematical concepts in place of calculator "magic", so the use of these magical wands will be restricted. Calculators may be used on homework but will *not* be allowed on most mini-exams or exams. until we begin section 3.2 **(Wednesday, October 4.)** Even when calculators are allowed, the emphasis will always be on the correct mathematical work and the appropriate communication of that work.

Writing and correct notation. Mathematicians should write well. Please do not abbreviate (unless we have agreed on some common abbreviations.) Please write with good grammar, in complete sentences. Spell correctly. Write so that others will find your work easy to read. Display your work in correct mathematical notation, with equal signs, appropriate symbols and function notation.

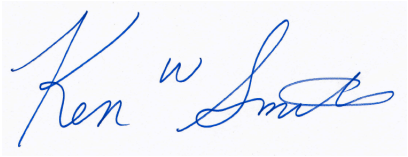
Screen capture. When working with computers or online programs (such as *WebAssign*) it is important to know how to capture an image of the computer screen. Capturing the image of the screen is a "screenshot" or "screen capture."

If one is working on a Macintosh computer (running *OS X*), one can hold down both the Command and Shift keys and then type the number 3. Other useful versions of the screenshot (such as capturing just a portion of the screen) are described at this webpage.

On some Windows machine, one can press the "PrintScreen" (`PrtScn`) button and capture an image of the screen which is saved to the clipboard. More details about this action are available at this webpage. If one is using *Windows 8*, another option is the *Snipping Tool*. A Microsoft short guide to using the Snipping Tool is available at this webpage.

This screenshot technique is particularly helpful when working with *WebAssign*. If you have tried a particular *WebAssign* problem several times and you believe your answers are correct but WA says they are not, take a screenshot of the *WA* problem, along with your answer, attach it to an email and send it to me. I will look at the screenshot and suggest ways to correct your error.

Final comment. Please feel free to talk to me. I want you to enjoy this class and I want you to do well!



Dr. Ken W. Smith,
Monday, August 14, 2017

PS. If you are interested in Honors credit for this class, please see me.

An appendix with a semester schedule is attached.

MATH 1410 Schedule, Fall 2017
(Online)

Part 1, Functions

1.0* Wednesday, August 23, 2017, Algebra Excellence (very brief review)

1.1 Wednesday, August 23, 2017, Function Definition

1.2 Friday, August 25, 2017, Function Graphs, **Mini-exam 1, over 1.0-1.1 & class syllabus**

1.3 Monday, August 28, 2017, Function Transformations

1.4 Wednesday, August 30, 2017, Function Symmetries

1.5 Friday, September 1, 2017, Function Composition

$\Longrightarrow$ Monday, September 4, 2017 (NO class, Labor Day)

1.6 Wednesday, September 6, 2017, Function Inverses

Part 2 Polynomials

2.0 Friday, September 8, 2017, Linear Functions (brief review)

$\Longrightarrow$ Friday, September 8, 2017, Last day to drop with full refund.

2.1 Monday, September 11, 2017, Quadratic Functions, **Mini-exam 2, over Part 1**

2.2 Wednesday, September 13, 2017, Polynomial Functions & Graphs

2.3 Friday, September 15, 2017, Polynomial Division & Zeroes

2.4 Monday, September 18, 2017, Complex Numbers, **Mini-exam 3, over 1.5-2.3**

2.5 Wednesday, September 20, 2017, More on Zeroes

2.6 Friday, September 22, 2017, Rational Functions

EXAM Monday, September 25, 2017, **Exam 1, over Parts 1 and 2.0-2.6.**

2.7 Wednesday, September 27, 2017, Rational Functions 2, End-behavior

2.8 Friday, September 29, Inequalities

Part 3, Exponents and Logs

3.1 Monday, October 2, 2017, Exponential Functions, **Mini-exam 4**

3.2 Wednesday, October 4, 2017, Applications of Exponential Functions

3.3 Friday, October 6, 2017, Logarithms

3.4 Monday, October 9, 2017, Algebra of Logarithms, **Mini-exam 5**

3.5 Wednesday, October 11, 2017, Solving Exponential Equations

3.6 Friday, October 13, 2017, 3.6, Applications of Logarithms

Part 4, Intro to Trig

4.1 Monday, October 16, 2017, Unit Circle, **Mini-exam 6**

4.2 Wednesday, October 18, 2017, Six Functions and Two Triangles

4.3 Friday, October 20, 2017, The Sine Wave

EXAM Monday, October 23, 2017, **Exam 2, over Parts 1-3.**

4.4 Wednesday, October 25, 2017, Trig on Right Triangles

4.5 Friday, October 27, 2017, Graphs of Six Trig Functions, **Mini-exam 7**

4.6 Monday, October 30, 2017, Inverse Trig Functions

4.7 Wednesday, November 1, 2017, Solving Problems with Inverse Trig Functions,

4.8 Friday, November 3, 2017, Trig Identies & Equations

4.9 Monday, November 6, 2017, Solving Equations with the Pythagorean Identity, **Mini-exam 8**

Part 5, Advanced Trig

5.1 Wednesday, November 8, 2017, Sum & Difference Formulas

5.2 Friday, November 10, 2017, Double Angle Formulas & Power Reduction

$\Longrightarrow$ Friday, November 10, is the last day to drop the class with a Q grade.

5.4 Monday, November 13, 2017, Law of Sines, **Mini-exam 9**

5.5 Wednesday, November 15, 2017, Law of Cosines & Solving Triangles

5.6 Friday, November 17, 2017, Polar Coordinates

EXAM Monday, November 20, 2017, **Exam 3, over Part 4 and 5.1-5.6.**

5.7 Monday, November 27, 2017, Complex Numbers & Polar Coordinates

5.8 Wednesday, November 29, 2017, Euler's Marvelous Formula

5.9 Friday, December 1, 2017, Vectors & Review

The Final Exam is **Monday, December 4, 2017.** It is comprehensive.