Math 112: Elementary Functions

The University of Oregon

CRN 23486

Winter 2021

Class Meetings: MTWF, 9:30–10:30, over Zoom

Instructor: Cruz Godar

Email: cgodar@uoregon.edu

Office Hours: over Zoom — MF 1:30–3:20, and by appointment

Learning Outcomes

A successful student can:

- identify — by formula, verbal description, or graph — the vertical and horizontal transformations that take a parent function to an indicated function
- identify a function as periodic from its definition
- describe characteristics of periodic functions such as period, as well as amplitude and midline where applicable

- describe the sine, cosine, and tangent functions from both unit circle and right triangle perspectives
- describe the characteristics of the sine, cosine, and tangent as functions
- calculate all angles and side lengths of both right and oblique triangles, given appropriate information
- compute using both degrees and radians as measures of angles
- use identities relating to the period of sine, cosine, tangent as well as identities relating to negative angles and the Pythagorean Identity
- construct functional models from trigonometric, exponential, polynomial and rational expressions
- describe vectors in a mathematical and physical science context
- add, subtract, and perform scalar multiplication on vectors
- find and interpret the dot product of two vectors as a measure of agreement between vectors

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Materials

Zoom: to interface with the class. It's free to download on just about every operating system there is.

Textbook: *Functions, Trigononetry, and their Applications*, version 2.0, by Daniel Raies

Calculator: A scientific calculator will save you time doing simple computations. You will only be allowed to use one of the following calculators on quizzes and exams: Casio fx-260, Casio fx-300MS (or Plus), Casio fx-300ES (or Plus), TI-30X (a, S, or IIS), TI-34. **No graphing calculators will be allowed**. The Casio fx-300MS is available from the UO Bookstore for about $13.

Assignments and Grading

Your total grade in the class is determined by your attendance and participation, and your scores on the homework, quizzes, midterm exams, and the final exam, weighted in the following manner:

Attendance: 2.5%
Participation: 2.5%
Weekly Homework: 10%
Weekly Quizzes: 10%
Midterm Exams: 25% each (50% total)
Final Exam: 25%
Your total grade at the end of the quarter will be rounded up to the nearest whole number. For example, a total grade of 88.2% will be rounded up to 89% and awarded a B+.

Attendance: Every day of class will consist of roughly 30 minutes of lecture and 20 minutes of breakout room discussion, where you'll work with another student on the current homework. Attendance to **both** of these sections is mandatory.

Participation: You'll have one participation grade per week that can be completed in one of three ways:

- Turning your camera on in every breakout room during the week and engaging in discussion.
- Showing up to an office hour and asking a question about a topic you don't fully understand.
- Sending me an email asking about a topic you don't fully understand.

Any one of these gives participation credit for the week. The point isn't to have annoying requirements — it's that these are things you should be doing anyway, and shouldn't take up any extra time. If you're doing well in the class, it's already a good idea to engage in the breakout rooms and help other students who might not have as good of a handle on the material as you do. If you're not doing as well as you'd like, you should already be coming to office hours or sending emails anyway.

Homework: The homework is split into two parts: a handful of book problems, which are graded on completeness (only on whether you attempted them), and two additional problems written by me, which are graded on correctness. These two parts are each worth half of the homework credit. Homework will be assigned every Friday and due at the start of class the following Friday. Every homework assignment covers the previous week's material. Working with others is strongly encouraged, but the final work you submit must be your own. Your lowest written homework score will be dropped. **No late work will be accepted unless there is a documented, excusable circumstance.** Such circumstances include sports events in which you are involved in an official capacity (competing or playing in the band, for example), or illnesses with doctor's notes. If this is the case and you are given a make-up opportunity, the late work must be submitted no more than one week after its original due date.

This is an online course, and so all homework will be submitted via Canvas. You have two options:

- Handwrite your homework as usual and scan it, via a scanner or your smartphone. A series of pictures will **not** be accepted — only a single pdf file may be submitted. To use your smartphone for this, use the built-in document scanner in iOS (accessible through the Files app by tapping the ... menu and selecting *Scan Documents*), or the Adobe Scan app for Android.
- Typeset your homework. All the course documents (like this syllabus) are written in a language called LaTeX which compiles to the clean-looking pdf file you see. Although it takes an hour or two to become comfortable with, LaTeX is used by people in nearly every STEM-related field, and learning it now will give you a major headstart. To get started, make an account at Overleaf and create a new project. You can type as usual, and to render math expressions, surround them in dollar signs — for example, $\frac{1}{2}$ will render as $\frac{1}{2}$. I'm more than happy to help with any difficulties you run into here.

Weekly Quizzes: We'll have a quiz every week on Fridays, replacing the breakout room time. You'll write your work on a separate sheet of paper, scan it, and upload it to Canvas within 20 minutes of the start time. Your lowest written homework score will be dropped. **No late work will be accepted unless there is a documented, excusable circumstance.** Such circumstances include sports events in which you are involved in an official capacity (competing or playing in the band, for example), or illnesses with doctor's notes.

Exams: Our class will have two midterms on the Fridays of weeks 4 and 8. Each midterm will cover multiple sections of material, and the final exam will cover all of the sections covered in the course. **No make-up or early exams will be offered, except in the case of a documented, excusable circumstance.** If this is the case, the exam must be taken as soon as possible, and no more than a week after it was originally given.

You'll need to have your camera on during the midterms and quizzes. If that doesn't work for you for any reason, let me know during the first week of classes and we'll find a solution.

- Midterm 1: Friday, January 29
- Midterm 2: Friday, February 26
- Final: 10:15 AM on Monday, March 15

A note on grading: the vast majority of problems in this class are graded on a four-point scale that is curved to an eight-point one:

8: Work that shows command of the material and has only a few small mistakes, if any.

7: Work that shows a strong understanding of the relevant material, but contains enough errors that they get in the way of the demonstration of that understanding.

5: Work that shows elements of understanding, but is too clouded with mistakes to be considered on the right track.

3: Work that demonstrates a very small amount of understanding — but still some.

0: No work shown for any problem where work is required or work that demonstrates no understanding at all of the relevant material.

Course Schedule

This schedule is tentative, and may change slightly throughout the quarter.

Week	Material
1	1.1–1.3
2	1.4–1.6
3	2.1–2.2
4	2.3–2.4
5	2.5–2.6
6	3.1–3.2
7	3.3–3.5
8	4.1–4.3
9	4.4–4.5
10	Review

Other Things

Accessibility: For those of you who are currently registered with Accessible Education Center for a documented disability, please present your paperwork to me during the first week of the term (or earlier) so that we can design a plan for you. Those of you with a disability, or who think they might have one, but are not registered with AEC should contact them as soon as possible. It is much more likely that measures can be taken to provide adequate special accommodation if the organization is done through AEC. Please let me know if you need additional accommodations.

Prohibited Discrimination and Harassment Reporting: I am a student-directed employee. For information about my reporting obligations as an employee, please see Employee Reporting Obligations. Students experiencing any form of prohibited discrimination or harassment, including sex or gender based violence, may seek information on safe.uoregon.edu, respect.uoregon.edu,

titleix.uoregon.edu, or aaeo.uoregon.edu or contact the non-confidential Title IX office (541-346-8136), AAEO office (541-346-3123), or Dean of Students offices (541-346-3216), or call the 24-7 hotline 541-346-SAFE for help. I am also a mandatory reporter of child abuse. Please find more information at Mandatory Reporting of Child Abuse and Neglect.

Conduct: This university exists for your benefit. If you believe something is not as it should be, don't hesitate to let me know.

And as you should hold the university to a high standard, I will hold all of you to one in return. Academic dishonesty, including looking at other students' quizzes or tests or using any materials other than those allowed during a testing period, submitting others' work as your own, or altering returned work and resubmitting it, will be met with the strictest disciplinary action possible.

A word on learning: Math is not a subject that is learned passively. It is one thing to understand examples from lecture and another thing entirely to work through problems by yourself. Students who come to lecture expecting it to be enough on its own to pass the tests — and therefore don't put much or any effort into the homework — typically end up with very poor class grades. For your own benefit, it's crucial to stay on top of the homework, to follow along with lecture, and to seek help — from a friend, from my office hours, from the textbook, or from a tutor — when that becomes difficult. In the same vein, it's critical that if you're struggling, you reach out before large assignments, not after. I want to help however I can, but if a test has already been graded and handed back, there's usually nothing I can do.