Math 3 Syllabus

Summer 2024 - Session 2
Synchronous Online

Instructor Information:
Name: Malachi Alexander
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Link: See Zoom tab in Canvas course.

Teaching Assistant Information:
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Teaching Assistant Information:
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Class Session: MWF 5:00pm - 7:30pm
Link: See Zoom tab in Canvas course.

You may request an appointment with the instructor if the office hours time provided does not work. To request, send an email with subject line "Math 3 Office Hours Request" and provide two or three times which work best for you. In general, I will not regularly check emails during weekends, so I cannot guarantee you responses during weekend days.

Course Textbook and References: There is no required textbook to this course. All readings and course content can be accessed through the Canvas course webpage.

Math 3
Course Description (5 Credits)
Inverse functions and graphs; exponential and logarithmic functions, their graphs, and use in mathematical models of the real world; rates of change; trigonometry, trigonometric functions, and their graphs; and geometric series. Students cannot receive credit for both MATH 3 and AM 3.

Course Requirements:
Prerequisite(s): MATH 2 or mathematics placement (MP) score of 200 or higher. Students may not enroll in or receive credit for MATH 3 after receiving credit with a 'C' or better in AM 11A, MATH 11A, MATH 19A, MATH 20A or equivalents.

Course Overview

The goal of this course is to explore the foundations of functions, many of the most common functions used in the sciences and their importance in real-world applications.

This course will be taught in an **online synchronous** format. You will access the zoom room for class using the **zoom tab on the left of the canvas course page**. Once you click the zoom tab, you will be entered into the classroom.

There will be readings assigned to be completed before each class and then class time will be spent practicing techniques and clarifying concepts from the reading. It is important to **complete readings before attending class** to maximize your retention of material and your ability to engage during class time. See **Course Outline** below for more details.

Important Dates	
Session 2 Begins	**July 29** Monday
Session 2 Add/Swap	**August 1** Thursday
Session 2 Drop *Tuition reversal.*	**August 5** Monday
Session 2 Request "W" Grade *No tuition reversal.*	**August 18** Sunday
Session 2 Change Grade Option	**August 25** Sunday
Session 2 Ends	**August 30** Friday
Session 2 Grades Due	**September 5** Thursday

Course Structure

This course will be taught synchronously and will use a flipped classroom model. You will be required to complete traditional lecture material outside of the class. In the scheduled class time, we will focus on group work and the discussion of the concepts and problems you see in the readings. It is important to complete readings prior to attending class sessions to maximize your retention of material.

Pre-Lecture Activities

This course is separated into 10 modules. In each module, you are expected to read the required sections, take notes, and answer questions through Knowledge Checks. Each knowledge check will consist of 2-5 questions related to the material covered in previous readings. If you miss a question on a Knowledge Check, you are encouraged to reread the section and try the Knowledge Check again. At the end of each module, you will be asked to complete a Module Summary, which will consist of a few short prompts to respond to.

Knowledge Checks are graded on correctness; however, you may repeat the questions **up to three times**.

Module Summary are graded on completion and **you may not resubmit them**. You must satisfy the minimum requirements for the reflection to count towards your pre-lecture content completion.

In-Class Assessments

You will be assigned a group of peers which you will work with throughout the summer session. You are expected to behave professionally and interact with your peers in constructive and meaningful ways.

Homework

Each week there will be a set of homework problems assigned through Canvas. You will receive multiple attempts for each problem on the homework set. These homework problems are meant to reinforce your knowledge and understanding from pre-lecture activities and in-class assessments.

Projects

This course will consist of two projects: a midterm project and final project. These projects are related to the core concepts taught through the pre-lecture activities, in-class assessments and homework and will include real-world applications. Each group is responsible for distributing tasks among its members and performing the agreed upon tasks. The core content of the project will be submitted as a group; however, there will be additional questions that each student will answer individually related to their role and participation in the project submission. Groups will be the same as the groups for the in-class assessments.

Contact Time Structure

Phase	Time	Description
Introduction & Review	10-25 min.	We will begin each class with an introductory activity, a statement of the learning objectives for the class, goals of the activities, group roles and deliverables for the class session.
Individual Assessment	10 min.	You will be given a selection of problems, which you will work through independently. You will not be given whether your solution is correct.
Group Discussion	20 min.	After the completion of these problems, you will be sent into breakout rooms with your respective group. During this breakout session, you will be responsible for discussing the questions you got incorrect, why you got them incorrect, and how to correct your mistakes. During this discussion, the group members will use their established group roles (see below). After the discussion, each group member will resubmit their work.
Class Debrief	35 min.	The class will return together as a whole. The instructor will provide clarification to problems, answer student questions, present partial or full solutions, ask groups to present solutions, or discuss the content more generally.
Break	10min.	
Activity	30-40 min.	In groups, you will work on a group activity. In this activity, you will be expected to grapple with concepts, work through guided exploration, create examples, connect knowledge to real-world contexts and/or analyze methods and techniques.
Debrief	10 min.	At the end of the class, students may complete the group dynamics survey and the instructor will give you reminders about upcoming deadlines, office hours, and topics.

Group Roles

Groups will consist of 4-5 members which will be assigned by the instructor. Students will be assigned group roles at the beginning of a session, and they will cycle through the roles with each subsequent class meeting. The group roles are the following:

Facilitator: The facilitator should open the conversation by making sure their group members know their roles for the day. Throughout the group work activities, it will be up to the facilitator to ensure that all students in the group participate in the discussion.

Content Ambassador: The content ambassador will begin by stating the day's learning outcomes. They will then read the question to the group and open the discussion about the mathematics for the day. If the instructor asks for groups to present, it will be the content ambassador's responsibility.

Consensus Leader: The consensus leader's role is to ensure that everyone agrees on their solutions. Should students be unable to agree, the consensus leader will help to pinpoint the cause of the disagreement to add to their discussion work for the day. If consensus is reached, the consensus leader will ensure that solution is recorded.

*Advocate: The advocate's job is to check the team's understanding. The advocate will be the only student with the authority to ask the instructor for additional help; in order to do so, they must come to consensus with the group about the question and ensure that no one in the group has an answer.

*Administrator: While all students should be contributing to the written document for the day via the provided Google Docs or Google Slides, the administrator's job will be to ensure the notes are complete and to ensure that the group stays on time and on topic throughout the session.

*The advocate and administrator roles will not be used in the event that there are one or two students absent from the group.

Students will be expected to complete the group dynamics survey at the end of each class or at a later time specified by the instructor.

		Weekly Schedule	
Week	**Monday**	**Wednesday**	**Friday**
1	*Reading*: Syllabus	*Reading*: Module 1	*Reading*: Module 2
2	*Reading*: Module 3	*Reading*: Module 4	*Reading*: Module 4 Homework 1 & 2 Due
3	*Reading*: Module 5	*Reading*: Module 6	*Reading*: Module 7 Homework 3 & 4 Due Projects Draft 1 Due
4	*Reading*: Module 8	*Reading*: Module 9	*Reading*: Module 10 Homework 5, 6 & 7 Due Projects Draft 2 Due
5	*Reading*: None	*Reading*: None	*Reading*: None Homework 8, 9 & 10 Due Projects Final Draft Due

Course Learning Skills

Communication

Students will *express* mathematical ideas through verbal and written communication, using appropriate mathematical terminology, while building confidence in *utilizing* and *sharing* mathematical ideas

Personal Growth

Students will *develop* their mathematical identity and *connect* mathematics to their personal interests, while *considering* their own skills and strengths.

Problem Solving & Adaptive Competence

Students will *break down*, *explain* and *appreciate* mathematical tools, while *developing* problem solving strategies that can be *applied* flexibly and creatively across disciplines and outside of academia, and critical thinking skills to *identify* when different tools will be applicable

Metacognition

Students will *accept* mistakes as an integral part of the learning process and *utilize* misconceptions as moments of growth while *reflecting* on their learning and studying strategies.

Applications

Students will *break down* a physical system in order to *formulate* the problem mathematically.

Learning Objectives

LO1: Students should be able to recognize functions in their algebraic (i.e. including function notation, function operations and piecewise definitions) and graphical representations (including the Cartesian coordinate system, plotting functions and using transformations to graph functions).

LO2: Students should be able to solve linear equations and inequalities, apply knowledge of linear functions to real-world contexts, understand the various forms of linear functions (standard, slope-intercept, and point-slope) and their graphs.

LO3: Students should be able to solve quadratic equations and inequalities, apply knowledge of quadratic functions to real-world contexts, and understand the various forms of quadratic functions (standard, factored, and vertex), their graphs and various methods for finding zeroes (factoring, completing the square, and quadratic formula).

LO4: Students should understand the properties of polynomial functions (including zeroes, end behavior, degree, multiplicity) along with methods of determining zeroes (polynomial division, synthetic division, Rational Root Test, and Descarte's Rules) and how to solve polynomial equations and inequalities.

LO5: Students should understand the properties of rational functions (including zeroes, holes, end behavior, horizontal asymptotes, vertical asymptotes and oblique asymptotes) along with methods of solving rational equations and inequalities.

LO6: Students should be able to compose functions together, evaluate compositions of functions, decompose functions as the composition of other functions and understand the effects composition has on properties such as domain and range.

LO7: Students should be able to identify which functions are one-to-one, understand the relationship between composition and inverses, compute the inverses of specific polynomial and rational functions and understand how domain plays a role in invertibility.

LO8: Students should be able to solve exponential equations and inequalities, understand the various properties of exponential functions (end behavior, horizontal asymptotes, and intercepts), apply knowledge of exponential functions to real-world contexts, and understand their graphs.

LO9: Students should be able to solve logarithmic equations and inequalities, understand the various properties of logarithmic functions (end behavior, vertical asymptotes, and intercepts), apply knowledge of logarithmic functions to real-world contexts, and understand their graphs.

LO10: Students will be able to translate between degrees and radians, draw positive and negative angles using standard mathematical conventions, understand the basic trigonometric ratios (sine, cosine, tangent, cosecant, secant and cotangent) and utilize reference angles to compute trigonometric values.

LO11: Students will be able to graph periodic functions, including sine, cosine, tangent, cosecant, secant and cotangent) and identify various properties of trigonometric functions (phase shift, midline, vertical shift, period, frequency, and quarter points.).

LO12: Students will be able to apply various trigonometric identities (parity, the reciprocal and quotient identities, Pythagorean identities and periodicity identities).

LO13: Students will be able to define, graph and utilize inverse trigonometric functions, solve equations involving trigonometric and inverse trigonometric functions, and understand the various properties of the inverse trigonometric functions of sine, cosine, tangent, secant, cosecant and cotangent.

LO14: Students will be able to utilize more advanced trigonometric identities (sum and difference, cofunction, double-angle, half-angle identities) along with Law of Sines and Law of Cosines.

LO15: Students will be able to use right triangle trigonometry to solve for missing information, compute areas of certain triangles and apply Heron's formula to determine area for general triangles.

Grading & Assessment Policies

Grade Scale/Descriptions

A (A+)	Mastery of concepts, no problem will give an issue, understands why concepts work
B (B+)	Foundations are there, might struggle with problems which require multiple concepts, knows how to calculate
C (C+)	You know enough to be successful in next class, understands concepts independently
D/F	You are not ready to take the next mathematics course in the sequence.

Grading Scheme

Desired Grade	Grade Requirement
A+	97-100%
A	90-96.99%
B+	87-89.99%
B	80-86.99%
C+	77-79.99%
C	70-76.99%
D	60-69.99%
F	<60%

Grading Distribution

Pre-Class Activities (20%)	12% Knowledge Checks 8% Module Summary
In-Class Assessments (20%)	10% Daily Practice Problems 5% Daily Activity Worksheet 5% Daily Exit Ticket
Homework (20%)	20% Auto-Graded and Written Homeworks
Projects (40%)	20% Midterm Project 20% Final Project

Technology Requirements

This course is taught synchronously online, you must have access to:
- A computer with internet connection.
- Zoom (up-to-date to the most recent version)
- Google Drive

In this course, we will use:
- Canvas for homework assignments.

Conduct and Ethical Behaviors

As a **group based course**, it is essential that you approach your peers with empathy and respect. Should there be a conflict that arises within the group, you are welcome to reach out to me, or your TA, if you cannot find a resolution among group members. Since we work together in class, it is essential that all students are respectful of each other and open to hearing other input, points of view, and ideas.

The use of any external tools in this course should always be documented where appropriate in the assignment. For developing your answers to the projects, please note that you are told when you **cannot** use external tools or sources; in other problems, you may do so with **proper citation of the tool**. This includes the use of **online calculators**, **Wolfram-Alpha** or similar programs, and **artificial intelligence tools**. It is important to note that **artificial intelligence tools** can and do often get answers incorrect, as they are *predictive models* without any mathematical training. I strongly recommend that, should you use AI tools, you **check any work given to you** by AI, and explain that process in your own words as you turn in the project.

Academic Support:
Disability Resource Center
UC Santa Cruz is committed to creating an academic environment that supports its diverse student body. If you are a student with a disability who requires accommodations to achieve equal access in this course, please affiliate with the DRC. I encourage all students to benefit from learning more about DRC services to contact DRC by phone at 831-459-2089 or by email at drc@ucsc.edu. For students already affiliated, make sure that you have requested Academic Access Letters, where you intend to use accommodations. You can also request to meet privately with me during my office hours or by appointment, as soon as possible. I would like us to discuss how we can implement your accommodations in this course to ensure your access and full engagement in this course.

Tutoring and Learning Support
At Learning Support Services (LSS), undergraduate students build a strong foundation for success and cultivate a sense of belonging in our Community of Learners. LSS partners with faculty and staff to advance educational equity by designing inclusive learning environments in Modified Supplemental Instruction, Small Group Tutoring, and Writing Support. When students fully engage in our programs, they gain transformative experiences that empower them at the university and beyond.

Personal Support:
Counseling and Psychological Services
Many students at UCSC face personal challenges or have psychological needs that may interfere with their academic progress, social development, or emotional well-being. The university offers a variety of confidential services to help you through difficult times, including individual and group counseling, crisis intervention, consultations, online chats, and mental health screenings. These services are provided by staff who welcome all students and embrace a philosophy respectful of clients' cultural and religious backgrounds, and sensitive to differences in race, ability, gender identity and sexual orientation.

Student Success and Engagement Hub
The Division of Student Success provides campus-wide coordination and leadership for student success programs and activities across departments, divisions, the colleges, and administrative units.

Slug Support Program
College can be a challenging time for students and during times of stress it is not always easy to find the help you need. Slug Support can give help with everything from basic needs (housing, food, or financial insecurity) to getting the technology you need during remote instruction.
To get started with SLUG Support, please contact the Dean of Students Office at 831-459-4446 or you may send us an email at deanofstudents@ucsc.edu.

Emergency & Discrimination Support
[Title IX Office](#)
The Title IX Office is committed to fostering a campus climate in which members of our community are protected from all forms of sex discrimination, including sexual harassment, sexual violence, and gender-based harassment and discrimination. Title IX is a neutral office committed to safety, fairness, trauma-informed practices, and due process.

Title IX prohibits gender discrimination, including sexual harassment, domestic and dating violence, sexual assault, and stalking. If you have experienced sexual harassment or sexual violence, you can receive confidential support and advocacy at the [Campus Advocacy Resources & Education (CARE) Office](#) by calling 831-502-2273. In addition, [Counseling & Psychological Services (CAPS)](#) can provide confidential counseling support, 831-459-2628. You can also report gender discrimination directly to the University's [Title IX Office](#), 831-459-2462. Reports to law enforcement can be made to [UCPD](#), 831-459-2231 ext. 1. For emergencies call 911.

[On-Campus Emergency Contacts](#)
For all other help and support, including the health center and emergency services, start [here](#). Always dial 9-1-1 in the case of an emergency.

Technology Support
[Slug Help/Technology](#)
The ITS Support Center is your single point of contact for all issues, problems or questions related to technology services and computing at UC Santa Cruz. To get technological help, simply email help@ucsc.edu.

Syllabus Subject to Change

The instructor of the course reserves the right to amend the syllabus as necessary throughout the duration of the course.