



COLLEGE NAME: San Diego Miramar College
YOUR CONTACT INFORMATION (IF WILLING TO SHARE):

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COURSE NAME:

Math 150: Calculus with Analytic Geometry I

15E: Trigonometry Support

UNITS:

Math 150: Calculus with Analytic Geometry I (5 units)

15E: Trigonometry Support (1 unit lab course – 3 contact hours)

REGISTRATION:

Students register for a learning community for both courses. This is an automated process through the registrar. Students have to register for both courses. If they drop one course, they get dropped from the other course.

Course are integrated, focusing on providing just-in-time support as necessary.

PLACEMENT:

Students can sign up for the corequisite Calculus I class with no prerequisites.

Students who want to sign up for the standalone class need to have the appropriate prerequisites (receive a passing grade in our Precalculus course OR a passing grade in their high-school Precalculus class). Student self-repost the highest math class and grade they received in CCC Apply. We don't have a way to check their high-school transcript to verify.

There is quite a range in the corequisite course: a mix of students who have taken Precalculus (college level or high school) and students who have not taken Precalculus. A few students had never seen trigonometry. Some students had need out of school for a long time.

SCHEDULE: The Calculus course is scheduled two days per week (2.5 hours per session) and the support course is scheduled for 3 hours on Friday. We are playing around with some hybrid options. (Calculus hybrid and support course all in-person). Out support course is not approved for distance learning.

TEXTBOOK:

We use a free textbook from OpenStax (Calculus Volume 1 – Strang and Herman) and MyOpenMath for homework.



COURSE MANAGEMENT SYSTEM:

We use Canvas. The course has a single Canvas course for students. The grading for each course happens in the same Canvas Shell. The support course assignments are typically graded on completion.

GRADING:

- Homework (10%). This includes MOM Homework and Skill Practice assignments. Students are required to do homework, but I replace the homework grade with the exam average if their exam average is higher.
- Online Assignment (weekly): Student complete MOM assignments focused on skill building. These are usually video assignments. They watch a video embedded in the MOM assignment and then answer a few questions related to this. This is included in the homework grade above.
- Discussion (5%): Student complete a weekly discussion post outlining what they studied that week and post a problem with its solution. They discuss what they feel comfortable with and what they find challenging about the week's topics. They need to reply to one other student. This is included in the Homework grade.
- Study Guides (10%) Students complete a weekly study guide (12 – 20 questions) "by hand". They get feedback and can revise their work and resubmit.
- Quizzes (5%) Students complete a weekly in-class quiz (2 – 3 questions) on the previous week's lessons. They spend 5-10 minutes working on the quiz by themselves and then 5 – 10 minutes with a group. They can talk to anyone in the class except me.
- Exams (60%) We have 4 exams (limits, derivatives, applications, integration). Each exam consists of a group exam (2 – 3 questions) and an individual exam (9 questions). The group exam is 10% of the exam grade and the individual exam is 90% of the exam grade. The student can use the group exam as a tool for the individual test. Students are not allowed a not sheet. I include very few formulas on the exam (geometry formulas, quadratic formula, trig identities, log identities)
Students can retake two exams to improve their grades. After receiving their graded exam (two class periods after they take the exam), they have two weeks to retake a different version of the exam. If they choose to retake, I ask students to work through the original test problems again, with the help of a tutor if they want, and practice more problems of the same kind from their exam study guides or notes. Then students need to meet with the instructor or the TA to go over the problems on the exam. This is to ensure students are prepared to retest or for us to reteach some concepts one-on-one and recommend more topics for study. Students typically perform significantly better on retakes.
- Final Assessment (10%). Students have a choice of taking a cumulative final exam or completing a portfolio. Around $\frac{1}{4}$ of the students take the cumulative final exam and $\frac{3}{4}$ of the students complete the portfolio. For the portfolio students need to make a website with four components (reflection on exams, project and reflection, video lesson of a section from the course (at least 10 minutes with at least 4 problems), video lesson on an application problem)
- Project (5%) – Calculus Games: Students need to create a engaging and physical interactive game that teaches other students a topic from the course. Students submit a



document of at least 20 questions and their solutions). They bring the game to class and play it with other students. They submit a reflection on the process and learning they gained through the project. The project is graded on correctness of their solution key, classroom participation and reflection.

ACTIVE LEARNING:

- Students solve problems at the whiteboards in a 360-degree format
- Lecture is broken up in Examples and Try It problems so students can practice each type of problems every 20 minutes or so before we move on to the next topic
- The weekly quizzes offer much engagement from the students. Students have 10 minutes to work on quizzes individual and then they can talk to other people in the class. Even though the quizzes are worth few points students are motivated to help and teach each other and often stay 20 – 30 minutes after class to make sure they understand how to do the problems.
- Classroom is set up in “pods” with students sitting in groups of four. This is conducive to student collaboration throughout the class.
- Students work on open-ended, conceptual problems in their table groups or at the whiteboards.

GROWTH MINDSET:

- We talk about growth mindset early in the semester. I show students a 10-minute video on growth mindset and effective studying skills in math classes in Week 3 of the semester.
- My grading scheme is geared towards a growth mindset with opportunities for students to learn from mistakes and resubmit work after revisions. Revisions are allowed for weekly study guides and retakes are allowed on two exams of their choice.
- I give students an exam reflection survey after Exam 1 to get them to think what resources they are or are not using, how they are studying, what changes do they need to make to their routine.
- We continuously talk about learning from our mistakes and growth in our understanding of key concepts.

EXAMPLE ASSIGNMENT:

An assignment I really like is “How Many Licks?”

One student in a group suck on a Tootsie Roll pop at 30 second interval and the group records the circumference of the pop. The graph the data in Desmos and find the slope of the line. Then they use Related Rates to figure out the rate of change of the volume of the pop.

Here is a link to the activity instructions: [How Many Licks?](#)

OTHER COURSE ELEMENTS:

- I provide (and print out) weekly lecture note packets that includes objectives, formulas, classroom examples and “Try Its”. Students follow along and fill in the lecture notes during lecture and work time. I don’t grade or collect these.



- I record the lecture parts on Zoom and provide the zoom link of the recordings for students in Canvas.
- I work with our Career and Outreach offices to organize a STEM Career event with a Latinx focus - **El Chisme on Engineering Careers**. The event is scheduled during my class time, and I take all students to our Student Center to meet with the panelists. Students first complete an assignment in class where they talk to each other in groups about career goals and then each group writes down questions that they want to ask the panelists in a Google Doc. We thus create a master document of questions. On the day, students and panelists sit at round tables (1 professional + 6 students) and engage in conversations about education/career/internships etc. The professionals switch tables every 10 minutes. After the event, the students complete a reflection assignment on this experience.

Typical Class Day:

- Agenda on the board summarizes the day's topics and upcoming due dates
- Cycle of lecture/groupwork/lecture/board work/lecture/etc
- I lecture in approximately 20-minute chunks, then give students 10 – 20 minutes to work over similar examples in groups. Sometimes I ask students to work at their table groups, sometimes I ask them to stand up and work at the board. Working at the board is great because students can see what the other groups are doing and self-correct. My embedded tutor and I walk around to ask probing questions, reteach or go over algebra skills.
- One day per week, I give them a quiz at the end of class with 2-3 questions. The first 10 minutes, students need to work by themselves, then they can collaborate. Typically, students will stay 10 – 30 minutes after class (into my office hours) to work with each other. Students are really engaged with the quizzes, and they really want to teach each other how to do the problems. Not many students just copy the answers from each other.
- I have office hours, and my embedded tutor has workshop hours right after class in our math lab five days per week.