F21 MATH D001A 03D Calculus

Instructor: Doli Bambhania

Course Description:

This is the Calculus component of Pushing Past our Limits: Achieving Success Together in Calculus and Programming!

This course covers the fundamentals of differential calculus. Specifically, the course includes the basic concepts of analytic geometry, limits, derivatives, and their applications. The topics covered will include graphs and derivatives of algebraic, trigonometric, exponential, logarithmic, and hyperbolic functions. Applications, such as, motion, differentials, related rates, graphing, and optimization, will be covered. There will be a greater focus on mathematical rigor than is often present in precalculus courses, with extra emphasis on definitions, precise notation and logic.

Course Content:

- Introduction to limits, definition of limits, theorems on limits, one-sided limits, computation of limits using numerical, graphical, and algebraic approaches, delta-epsilon definition of limit
- Continuity and differentiability of functions, determining if a function is continuous and differentiable at a real number
- Limits involving infinity and asymptotes
- Introduction to derivatives, and the limit definition of the derivative at a real number and as a function
- Use of differentiation theorems, derivatives of algebraic, trigonometric, inverse trigonometric, exponential, logarithmic, and hyperbolic functions, the chain rule, implicit differentiation, differentiation of inverse functions, higher order derivatives
- Use of derivatives for applications including equation of tangent lines, related rates, differentials, and Newton's Method
- Local/relative and global/absolute extrema of functions
- Rolle's theorem and the Mean Value Theorem
- The first derivative test, the second derivative test and concavity
- Graphing functions using first and second derivatives, concavity, and asymptotes
- Applications of extrema including optimization
- Indeterminate forms, and L'Hopital's Rule
- Antiderivatives

Important Notes about Online Learning:

- **Communication**: You can contact me via email (bambhaniadoli@fhda.edu) or via Canvas message. You can expect a response within 24 hours on weekdays and within 48 hours on the weekend. If you don't get a reply back to your email, try Canvas message, and the vice versa.
- **Engagement**: Since we are conducting the class fully online, we will look for your engagement through participation during synchronous sessions, and through the submission of assignments. Be sure to submit all first week and second week assignments to get into the "rhythm" of the class. Please note that if you do not submit the first discussion, Introduce Yourself on time, we will assume that you are not interested in being in the learning community and drop you!
- **Feedback**: Any feedback on your discussions, problem sets and written parts of exams will be provided as annotation or assignment comment in Canvas. If you need additional feedback regarding grading (especially automatically graded items such as homework and quizzes), please email/message me directly about that assessment. I will aim to grade all items within a couple of days of submission, but you can expect assignments and assessments to be graded within 1 week of submission.

If, for any reason, you stop participating and intend to drop the class, please do an official drop in a timely manner. If you fail to do so, you will receive an 'F' in the class. Follow the deadlines for this class in My Portal. We do not have the ability to make exceptions to these.

Textbook and Calculator:

Great news: your textbook for this class is available for **free** online!
Calculus, Volume 1 from OpenStax (Links to an external site.), ISBN 1-947172-13-1

You have several options to obtain this book:

- View online (Links to an external site.) (Links to an external site.) (Links to an external site.)
- Download a PDF (Links to an external site.) (Links to an external site.) (Links to an external site.)

You can use whichever formats you want. Web view is recommended -- the responsive design works seamlessly on any device.

You will need a scientific calculator, and occasionally a graphing calculator, for this class. This can be a physical or an online app, such as the one at https://www.desmos.com/ (Links to an external site.).

Video Lectures and Prepared Lecture Notes:

All of the lectures for this class are prerecorded. The PDFs for prepared lecture notes will be shared with you. You can find both in Modules under weekly activities. These are designed to help you keep your lecture notes organized. Please print the prepared lecture notes, or open them on a tablet if you have the ability to annotate electronically. As you watch the prerecorded video lectures, take notes! Keep all your notes organized in a binder. I strongly recommend that you do this. If you don't have access to a printer or a tablet, then simply take notes in a regular notebook, as you would in any other class. I hope that having prerecorded lecture notes provides you with an ability to tailor learning per your needs. Feel free to pause, replay or change the speed, as needed.

Weekly Schedule:

- **Thursday through Sunday** (and other days)**:** Read textbook, watch lecture videos (and take notes on the prepared notes), work on homework, respond to discussion boards, and study!
- **Mondays and Wednesdays**: We will have synchronous Zoom meetings on these days. The link can be found in the Zoom tab in Canvas. **The passcode is: calculus.** You're expected to attend each of these meetings. Be sure to watch appropriate lecture videos before attending these meetings. We will use these synchronous meeting times to go over your questions, additional examples, work on problem sets in groups and take quizzes and exams.

Office Hours:

- Mondays 9 - 10 a.m. (Zoom link: https://fhda-edu.zoom.us/j/91505804236 (Links to an external site.))
- Tuesdays, Wednesdays, Thursdays 2 - 3 p.m. (Zoom link: https://fhda-edu.zoom.us/j/93480388680 (Links to an external site.))
- Or, by appointment (email me to schedule)

Tutoring/Counseling Hours:

- Monday through Thursday 12:30-1:20pm (Zoom link: *coming soon*)
- Wednesday, Thursday 8-9pm (Zoom link: *coming soon*)

Homework and Problem Sets

The best way to succeed in any math class is to do all of the assigned work correctly and in a timely manner, making sure you really understand what you are doing! Focus on how to think mathematically about problems, not just on following a procedure! Time spent on the homework and problem sets will directly benefit you on quizzes and exams.

Online Homework: You will have online homework for each section we cover. The homework uses the free software MyOpenMath, and will be graded for correctness. The links and due dates are within the Canvas Modules, but generally speaking, the Online Homework is due Wednesdays at 11:59pm. You will have 5 late passes, each of which will give you a 24-hour extension on the homework for a particular section.

Problem Sets: Each week, we will have a problem set that you will work on. These problems will be posted as a PDF in the Canvas modules. You are to start work on them in groups in Zoom breakout rooms, work them out on paper, and submit them individually by the deadline on Fridays at 12:00pm (noon). You will start them in class, but will need to finish them up on your own. You These sets include problem-solving and critical-thinking exercises that rely on your conceptual understanding of the material and related skills.

Problem Sets Submission Guidelines:

- *Even though the problems will be discussed in groups, write up your own solutions independently. NEVER copy anyone's work for any reason!*
- *Label each problem clearly – use a highlighter to mark the number, or put a box around it so it's easy to find. You don't need to write the question, just fully-worked out solutions.*
- *Do the problems in order, showing all work neatly, clearly and completely.*
- *Write your solutions out in full detail, as modeled in the textbook and in lectures. It's important to write up problem sets neatly, showing all work, and explaining the logic behind each step. You should also draw well-labeled and appropriately scaled diagrams and graphs when they are helpful in understanding your solution.*
- *At the end of the problem set, give a participation rating (from 0-4) to each group member, including yourself. If there were any issues working with your group, please describe.*
- *Submit a single PDF document, NOT multiple images. Use the Notes app on iOS, or a scanning app such as Adobe Scan or Genius Scan (both free), or something else from among many options. Be sure to check that your scanned copy is legible. I will need to be able to read it for you to get points.*
- *Problem sets are due on Fridays at noon. You can have a 24-hour extension with 10% penalty.*

Joint Discussions:

There will be **five** discussion prompts that you will need to respond to spread throughout the quarter. These are worth points for both of the classes in the learning community, so be sure to complete them. Please follow Discussion Guidelines (see under 'Getting Started' in Modules) when completing them.

Joint Assignments:

There will be **two** joint assignments. These will be programming assignments in which you work with calculus concepts. They will be given during Week 3 and Week 10. You will get credit in both of the classes for these assignments.

Participation:

Even though this is an online class, you are expected to actively participate. we expect you to:

- Ask and answer questions during the synchronous portions of our class. You can raise your hand to speak, or use the chat feature in Zoom.
- Participate actively in breakout rooms:
    - Come prepared, having at least watched the assigned videos.
    - Keep video on throughout. Turn audio on to speak.
    - Use tools such as Share Screen with Zoom whiteboard or your own tablet to aid discussion.
- Outside of class, post and answer questions in 'Questions Discussion Board' (1 point extra credit for posting or answering a question).
- You will be given a subjective participation grade **three** times during the quarter. This will include your participation in class as well as in breakout rooms.

Quizzes:

We will have **nine** 20-minute quizzes (see the calendar at the bottom of this page). These will be similar to your online homework. We will do them during the synchronous section of class. You will need to submit them on time to receive any points. *IMPORTANT: There will be NO MAKEUPS for any of the quizzes. However, your lowest quiz score will be dropped.*

Exams:

We will have **two** midterm exams, and a cumulative final exam. See the calendar for the dates. Exams must be taken at the scheduled time, so pay careful attention to their dates and times. The exams will contain an online portion and a written portion. The written portion will need to be done on paper and scanned (or on a tablet) and submitted by the exam closing time
IMPORTANT: There will be NO MAKEUPS for any of the exams.

NOTE: In case of an unforeseen emergency or illness due to which you cannot take an exam, please get in touch with me immediately, and we can work with you to find a solution. If this happens for the final exam, that may result in an 'Incomplete' (provided that you supply me with a sufficient proof).

Evaluation:

Your final grade will be computed as follows:

Point Values of Assignments and Assessments

Category		**Points**
Homework	27 @ 5 points each	135
Problem Sets	11 @ 10 points each	110
Joint Discussions	5 @ 10 points each	50
Joint Assignments	2 @ 15 points each	30
Participation	3 @ 5 points each	15
Quizzes	Top 8 @ 15 points each	120
Exams	2 @ 70 points each	140
Final Exam		100
TOTAL		**700**

Letter Grade based on Overall Percentage

Overall percentage	Your grade will be at least
97 % or greater	A+
92% to less than 97%	A
89% to less than 92%	A-
87% to less than 89%	B+
82% to less than 87%	B
79% to less than 82%	B-
75% to less than 79%	C+
70% to less than 75%	C
55% to less than 70%	D
less than 55%	F

Help:

1. Your classmates are a great resource. Ask for help and provide help to others either within your current groups or using the Questions Discussion Board (worth extra credit)!
2. Message me through Canvas with questions or attend office hours. For online homework questions, message me by using 'Message Instructor' button in the problem.
3. Ask questions during our synchronous meetings.
4. Get help from De Anza's Math Student Success Center. See details at http://deanza.edu/studentsuccess/.
5. Use NetTutor for help through Canvas.
6. If you need any technical help with MyPortal, Zoom, Canvas, etc., visit https://www.deanza.edu/online-winter/#Learning (Links to an external site.).
7. On the link above, under 'Student Services and Support', you will find links to services with some specific to this time, such as for help with tech equipment, food and financial assistance, health services, resources for undocumented students, etc.

Academic Integrity:

All students are expected to exercise academic integrity throughout the term. Any instances of cheating or plagiarism will result in disciplinary action, including at minimum, 0 on the assignment or assessment, but may include recommendation for dismissal. You are encouraged to work together on homework but simply copying down from someone else's work is wrong! Cheating on a quiz or an exam is more serious. It will certainly result in getting a 0 on the assessment, but could result in getting an 'F' in the course or dismissal from the class. Also, each incident of cheating on an assessment will be reported to the Dean of the Physical Science,

Mathematics and Engineering Division and the Office of Student Development. Please see the De Anza College's page on Academic Integrity: https://www.deanza.edu/policies/academic_integrity.html (Links to an external site.). Check out this video produced by De Anza College on this topic: https://www.youtube.com/watch?v=4unoOe-I0eY (Links to an external site.).

A note about Discord: We encourage you to ask and answer questions amongst yourselves to strengthen your understanding of topics in this class using any medium, including Canvas discussion boards and Discord. However, be careful that you don't compromise your academic integrity or entice others to compromise theirs! For example, never answer a classmate's question about a homework problem by providing a complete, fully worked out solution! There are at least two reasons for this: 1) It would create too much of a temptation to copy - not necessarily for the original question poster but other classmates; and 2) Your solution could be incorrect, in which case you would be hindering the class' understanding of the involved concepts and skills. It goes without saying that you should also never discuss anything during a quiz or an exam on Discord or any medium.

Disability Notice:

If you feel that you may need an accommodation based on the impact of a disability, please contact me privately to discuss your specific needs. Also, please contact Disability Support Programs & Services through https://www.deanza.edu/dsps/ (Links to an external site.) for information or questions about eligibility, services and accommodations for physical, psychological or learning disabilities.

Tips for Success in this Class:

- Taking classes online comes with a set of challenges, such as staying motivated, speaking up in class, conflicts with work and other responsibilities, working with classmates, getting help, feeling a sense of community with the class, the lack of ideal workspace, and technical issues, such as device malfunction or unreliable internet access. About half of all students report 'staying motivated' as their greatest challenge in online learning.
- In any math class, and especially this one, your goal should be to get **ownership** of the material. This means that not only you understand the concepts, and can demonstrate the skills, but also that you can explain them to someone who doesn't have them. The material covered in this class is essential for the next courses in the series. This is not a "learn and forget" class; rather, it's a "learn well so you can succeed going forward" class. All of this is also true for your CIS class.
- Here are our recommendations for succeeding in the learning community in the online setting:

1. **Log into Canvas every day!** Do some work related to the class every day. Check for upcoming deadlines and make sure you are aware of them.
2. **Stay on schedule**. Stick to the schedule on the calendar. Don't fall behind! Be disciplined about this to stay on top of the class. When you watch the videos, take careful notes in the prepared lecture notes. Writing aids memory so you are more likely to retain the material you watched. The quarter passes by faster than expected – especially if you're new to the quarter system – and it's almost impossible to catch up.
3. **Be fully present in every synchronous session.** Allowing yourself to occasionally miss class, or multi-task during class, is a slippery slope. It can easily turn into a bad habit that will likely cost you the grade you want in this class.
4. **Come to the synchronous sessions prepared and ready to contribute!** Be sure to have watched the required videos and completed any required readings so you can benefit from the synchronous sessions and contribute.
5. **Invite productive struggle.** To succeed in any STEM class, you must **do your work diligently**. We are aware that there are many sources that can provide you the answers and even the worked solutions. However, **productive struggle** is essential in learning and retaining the material, and in gaining the confidence in your problem-solving ability. You must sweat through the problems, especially the ones that challenge you.
6. **Form a study group**. Exchange your contact information with at least 3 other people in the class community. This will come in handy if you need to miss a class, if you want to work with someone on an assignment, or while studying for an exam. This is an **essential college skill**, especially for STEM students.
7. **Turn everything in!** Every homework, every discussion, every problem set. Don't allow yourself to skip! Also, pay close attention to the dates and start/end times of quizzes and exams, so you don't miss any part of them.
8. **Prepare well for assessments.** Even though all quizzes and exams will be open-book, open-notes, prepare as if you were allowed only paper, pencil and calculator. Preparing this way for quizzes will help you retain the material for exams. Preparing this way for exams will help you retain this material for when you need it for the classes that come next in the sequence. If you are not prepared well for quizzes and exams, you will likely NOT be able to finish them!
9. **Don't wait to ask for help!** Whether it's to your classmates or me, get your questions answered in a timely manner. If you're dealing with an unusual or an unexpected challenge, please let us know so we can work with you to keep the class manageable.
10. **Practice personal discipline**! Succeeding in a college class requires **personal discipline**. This is especially true for online classes. It's quite easy to put things off until later, skip some video lectures, skip taking notes while watching them, distract yourself with social media and other apps while doing class activities, etc. A life skill you should practice this quarter: **Be mindful of what you are giving your attention to.** Think carefully about your priorities, and give the most time and attention to your biggest priorities. When working on your homework, turn off all notifications on your devices, silence your phone and keep it out of immediate reach. Calculus requires focus and it will often challenge you. Don't put off working on something because it's hard or unpleasant. Learning anything that's worthwhile requires a sustained effort! And that practice is what ultimately leads to true personal growth.

Course Calendar:

Math 1A Calculus - Tentative Calendar: Fall 2021 (LinC - MW 10:30-12:20)

	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
Week 1	17-Sep	18-Sep	19-Sep	20-Sep	21-Sep	22-Sep	23-Sep
	Watch Videos: 2.1, 2.2			Orientation/Questions Problem Set 1	*Work on online HW and Problem Set*	Problem Set 1, Questions **Quiz 1** (on 2.1, 2.2)	*Finish Problem Set*
Week 2	24-Sep	25-Sep	26-Sep	27-Sep	28-Sep	29-Sep	30-Sep
	Watch Videos: 2.3, 2.4, 2.5			Overview, Questions Problem Set 2	*Work on online HW and Problem Set*	Problem Set 2, Questions **Quiz 2** (on 2.3, 2.4, 2.5)	*Finish Problem Set*
Week 3	1-Oct	2-Oct	3-Oct	4-Oct	5-Oct	6-Oct	7-Oct
	Watch Videos: 3.1, 3.2, 3.3			Overview, Questions Problem Set 3	*Work on online HW and Problem Set*	Problem Set 3, Questions **Quiz 3** (on 3.1, 3.2, 3.3)	*Finish Problem Set*
Week 4	8-Oct	9-Oct	10-Oct	11-Oct	12-Oct	13-Oct	14-Oct
	Watch Video: 3.4, 3.5			Overview, Questions Problem Set 4	*Work on online HW and Problem Set*	Problem Set 4, Questions **Exam 1** (on 2.1 - 3.5)	*Finish Problem Set*
Week 5	15-Oct	16-Oct	17-Oct	18-Oct	19-Oct	20-Oct	21-Oct
	Watch Videos: 3.6, 3.7, 3.8			Overview, Questions Problem Set 5	*Work on online HW and Problem Set*	Problem Set 5, Questions **Quiz 4** (on 3.6, 3.7, 3.8)	*Finish Problem Set*
Week 6	22-Oct	23-Oct	24-Oct	25-Oct	26-Oct	27-Oct	28-Oct
	Watch Videos: 3.9, 6.9			Overview, Questions Problem Set 6	*Work on online HW and Problem Set*	Problem Set 6, Questions **Quiz 5** (on 3.9, 6.9)	*Finish Problem Set*
Week 7	29-Oct	30-Oct	31-Oct	1-Nov	2-Nov	3-Nov	4-Nov
	Watch Videos: 7.1 (Vol 2) , 7.2 (Vol 2), 4.1			Overview, Questions Problem Set 7	*Work on online HW and Problem Set*	Problem Set 7, Questions **Quiz 6** (on 7.1, 7.2, 4.1)	*Finish Problem Set*
Week 8	5-Nov	6-Nov	7-Nov	8-Nov	9-Nov	10-Nov	11-Nov
	Watch Videos: 4.2, 4.9			Overview, Questions Problem Set 8	*Work on online HW and Problem Set*	Problem Set 8, Questions **Exam 2** (on 3.6-3.9, 6.9, 7.1, 7.2, 4.2, 4.9)	HOLIDAY: Veteran's Day
Week 9	12-Nov	13-Nov	14-Nov	15-Nov	16-Nov	17-Nov	18-Nov
	Watch Videos: 4.3, 4.4, 4.5			Overview, Questions Problem Set 9	*Work on online HW and Problem Set*	Problem Set 9, Questions **Quiz 7** (on 4.3, 4.4, 4.5)	*Finish Problem Set*
Week 10	19-Nov	20-Nov	21-Nov	22-Nov	23-Nov	24-Nov	25-Nov
	Watch Videos: 4.6, 4.7			Overview, Questions Problem Set 10	*Work on online HW and Problem Set*	Problem Set 10, Questions **Quiz 8** (on 4.6, 4.7)	HOLIDAY: Thanksgiving
Week 11	26-Nov	27-Nov	28-Nov	29-Nov	30-Nov	1-Dec	2-Dec
	Watch Video: 4.8, 4.10			Overview, Questions Problem Set 11	*Work on online HW and Problem Set*	Problem Set 11, Questions **Quiz 9** (on 4.8, 4.10)	*Finish Problem Set*
Finals Week	3-Dec	4-Dec	5-Dec	6-Dec	7-Dec	8-Dec	9-Dec
	Prepare for Final Exam					**Final Exam 9:15 - 11:15 am**	

Student Learning Outcome(s):

*Analyze and synthesize the concepts of limits, continuity, and differentiation from a graphical, numerical, analytical and verbal approach, using correct notation and mathematical precision.
*Evaluate the behavior of graphs in the context of limits, continuity and differentiability.
*Recognize, diagnose, and decide on the appropriate method for solving applied real world problems in optimization, related rates and numerical approximation.