Instructor:	Akil Narayan
Email:	akil@sci.utah.edu
Office:	WEB 4666 and LCB 116

Office hours:	Mondays 9:30-10:30 in WEB 4666 & Thursdays 1:30-2:30 in LCB 116

Class type: In Person

Class time and location:	MTWF	10:45am-11:35am	CTIHB 109
Lab component: Section 024	Th	10:45-11:35am	LCB 323
Section 025	Th	10:45-11:35am	BEH S 105
Section 026	Th	11:50-12:40pm	LCB 121
Section 027	Th	11:50-12:40pm	LCB 222
Section 028	Th	9:40-10:30am	LCB 323

Attendance policy: Attendance during lectures is *not* a part of your grade. However, I strongly recommend that you attend the lectures; attendance is an essential ingredient for success in this course.

Course webpage: http://www.sci.utah.edu/~akil/math1210. This webpage will contain posted lecture notes and resources.
Canvas: Graded assignments will be collected on Canvas and grades will also be posted on Canvas.

Course Information: This is a 4-credit course.

Prerequisites: Recommended prerequisite is (MATH 1050 and MATH 1060) or MATH 1080 with a C or better, an Accuplacer AAF score of at least 276, an ACT math score of at least 28, an SAT math score of at least 650, or an AP AB Calculus score of 3.

Course description: Functions and their graphs, differentiation of polynomial, rational and trigonometric functions. Velocity and acceleration. Geometric applications of the derivative, minimization and maximization problems, the indefinite integral, and an introduction to differential equations. The definite integral and the Fundamental Theorem of Calculus.

Text: Required: *Calculus with Differential Equations*, by Varberg, Purcell, and Rigdon (9th edition)

For information on purchasing the textbook, visit https://www.math.utah.edu/resources/bookinfo.php
Class lectures will be *heavily* based on accompanying textbook material. The textbook provides additional details and alternative interpretations that cannot be covered in class due to time constraints. Homework will be assigned partly from problems in the textbook. Access to the textbook is mandatory for success in this class.

Class meetings: The large group of this class meet in person four times per week. These meetings will primarily be lecture-based, which will include a discussion of theory and practice examples. I encourage you to participate in class, in particular with questions and related discussions.

Accompanying lab sections of this class meet once per week, and will focus on a more in-depth exploration of topics recently covered in lecture and homework.

Homework: Homework is worth 25% of your cumulative grade. Problem sets will be due weekly, posted and collected on Canvas (through Gradescope). Late homework assignments will generally **not** be accepted.
Each homework assignment is worth equal weight and the lowest score for a single homework assignment over the semester will be dropped. You are welcome (and encouraged) to work on the homework assignment in groups, *but each student must submit individual work*.

Lab component: Labs are worth 15% of your cumulative grade. Labs are weekly smaller group meetings featuring in-depth exercises with substantial active learning components. Each week you will submit a lab sheet that will be graded – labs are group work, and so you will work together to complete the lab assignment. Your lowest two lab scores will be dropped.

Midterm exams: Midterm exams are worth 39% of your cumulative grade. Midterm exams will be held during large-group class meetings, and are closed-book, closed-notes, and no calculator is allowed. There are 3 midterm exams over the course of this semester, each is equally weighted (13% weight per midterm exam). The 3 midterm exam dates are Friday, January 31; Friday, February 28; and Friday, April 4. Midterm exams are *not* comprehensive. E.g., the material covered on midterm #2 will only include material covered in class after midterm # 1. However, the material in this class builds progressively, so the best strategy for performing well is to keep up with the material throughout the entirety of the course.

Final Exam: The final exam is worth 21% of your cumulative grade. The final exam will be held in accordance with university policy on Tuesday, April 29 from 10:30am-12:30pm in CTIHB 109. Like midterm exams, the final exam is closed-book, closed-notes, and no calculator is allowed. The final exam *is* a comprehensive exam, covering all material from the entire course.

Grading: In summary, your course grade will be computed as follows.

- Homework 25%
- Labs 15%
- Midterm exams 39%
- Final exam 21%

Final letter grades will be assigned based on the following scheme:

- 92% - 100% — A
- 90% - 91% — A−
- 88% - 89% — B+
- 82% - 87% — B
- 80% - 81% — B−
- 78% - 79% — C+
- 72% - 77% — C
- 70% - 71% — C−
- 68% - 69% — D+
- 62% - 67% — D
- 60% - 61% — D−
- 0% - 59% — E

Important dates:

Jan 17		Last day to add, drop, audit, and elect CR/NC
Jan 31		**Midterm Exam 1**
Feb 28		**Midterm Exam 2**
Feb 28		Last day to withdraw from classes
Apr 4		**Midterm Exam 3**
Apr 18		Last day to reverse CR/NC option
Apr 23		Reading Day
Apr 29	**10:30am**	Final exam

Tutoring: The Department of Mathematics provides free tutoring services through the Tutoring Center for many 1000-level, 2000-level, and for some 3000-level courses. The Tutoring Center provides services for MATH 3150, and is located in room 155 of the T. Benny Rushing Mathematics Center, between buildings JWB and LCB. Please see `https://www.math.utah.edu/undergraduate/mathcenter.php` for attending information about the Tutoring Center and for hours of operation.

The Learning Center at the University of Utah (`https://learningcenter.utah.edu/`) also provides private tutoring services.

Learning objectives: This course serves to introduce students to foundational concepts in calculus, covering limits, differentiation and integration. Through consistent and regular written assignments and lab meetings, students will learn the rationale and motivation for the course concepts, will be able to demonstrate mastery of simple calculus operations, and will learn about applications of calculus to various aspects of engineering and the life and physical sciences. Upon successful completion of this course, students should be able to accomplish the following tasks.

- Take limits of algebraic and trigonometric expressions of the form $0/0$ (that simplify), non-zero number over 0, including limits that go to (positive or negative) infinity, limits that don't exist and limits that are finite.
- Use and understand the limit definitions of derivative for polynomial, rational and some trigonometric functions; understand the definition of continuity and consequences.
- Differentiate all polynomial, rational, radical, and trigonometric functions and compositions of those functions; perform implicit differentiation and compute higher order derivatives.
- Use differentiation to find critical points and inflection points, the signs of the first and second derivatives, and domain and limit information to determine vertical and horizontal asymptotes. Then use all of that information to sketch the graph of $y = f(x)$.
- Apply differentiation to optimization, related rates, linear approximation, and problems involving differentials.
- Compute indefinite integrals and find antiderivatives, including finding constants of integration given initial conditions.
- Compute definite integrals using the definition for simple polynomial functions. Compute definite integrals using the power rule, basic u-substitution, and the Fundamental Theorems of Calculus.
- Apply the definite integral to compute area between two curves, volumes of solids of revolutions, arc length, surface area for surfaces of revolution, and work problems.

Class communication: I will use the email list provided by University information services to communicate information. This email list will also be used to communicate class information in the case of unusual circumstances affecting the the logistics of the class. If you are not officially

registered for the class but wish to be on the roster, please discuss it with me. Some email communications will also be duplicated as announcements on Canvas.

If you are registered for the course, but do not receive the course email announcements to your University of Utah email address, please notify me immediately.

In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to change that may be necessitated by a revised semester calendar or other circumstances. The above two methods (email and Canvas), in addition to the coursewide website, are reliable means of getting information about changes to the course.

Communication with the instructor: The most reliable and preferred means of contacting me is via email, and I typically respond in less than 24 hours. Communication through the messaging system in Canvas will also work, but possibly with a slightly longer response time.

University-wide policies

Americans With Disabilities Act (ADA) The University of Utah seeks to provide equal access to its programs, services, and activities for people with disabilities.
All written information in this course can be made available in an alternative format with prior notification to the Center for Disability & Access (CDA), `https://disability.utah.edu/`. CDA will work with you and the instructor to make arrangements for accommodations. Prior notice is appreciated. To read the full accommodations policy for the University of Utah, please see Section Q of the Instruction & Evaluation regulations `http://regulations.utah.edu/academics/6-100.php`.
In compliance with ADA requirements, some students may need to record course content. Any recordings of course content are for personal use only, should not be shared, and should never be made publicly available. In addition, recordings must be destroyed at the conclusion of the course.
If you will need accommodations in this class, or for more information about what support they provide, contact:
  Center for Disability & Access
  801-581-5020
  `disability.utah.edu` 162 Union Building l
  200 S. Central Campus Dr.
  Salt Lake City, UT 84112

Academic Misconduct It is expected that students comply with University of Utah policies regarding academic honesty, including but not limited to refraining from cheating, plagiarizing, misrepresenting one's work, and/or inappropriately collaborating. This includes the use of generative artificial intelligence (AI) tools without citation, documentation, or authorization. Students are expected to adhere to the prescribed professional and ethical standards of the profession/discipline for which they are preparing. Any student who engages in academic dishonesty or who violates the professional and ethical standards for their profession/discipline may be subject to academic sanctions as per the University of Utah's Student Code: Policy 6-410: Student Academic Performance, Academic Conduct, and Professional and Ethical Conduct, `https://regulations.utah.edu/academics/6-410.php`.
Plagiarism and cheating are serious offenses and may be punished by failure on an individual assignment, and/or failure in the course. Academic misconduct, according to the University of Utah Student Code:

"...Includes, but is not limited to, cheating, misrepresenting one's work, inappropriately collaborating, plagiarism, and fabrication or falsification of information...It also includes facilitating academic misconduct by intentionally helping or attempting to help another to commit an act of academic misconduct."

For details on plagiarism and other important course conduct issues, see the U's Code of Student Rights and Responsibilities, `http://regulations.utah.edu/academics/6-400.php`.

Community: It is my intent that students from all diverse backgrounds and perspectives be well served by this course, that students' learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength and benefit. It is my intent to present materials and activities that are respectful of all backgrounds: gender, sexuality, disability, age, socioeconomic status, ethnicity, race, culture, etc. Your suggestions are encouraged and appreciated. Please let me know ways to improve the effectiveness of the course for you personally or for other students or student groups. In addition, if any of our class meetings conflict with your religious events, please let me know so that we can make arrangements for you.

Discrimination and Harassment: If you or someone you know has been harassed or assaulted, you are encouraged to report it to the Title IX Coordinator in the Office of Equal Opportunity and Affirmative Action, 135 Park Building, 801-581-8365, or Office of the Dean of Students, 270 Union Building, 801-581-7066. To report to the police, contact the Department of Public Safety, 801-585-2677(COPS). Please see Student Bill of Rights, section E `http://regulations.utah.edu/academics/6-400.php`. I will listen and believe you if someone is threatening you.

Classroom Social Interactions: Canvas allows students to change the name that is displayed AND allows them to add their pronouns to their Canvas name. Class rosters are provided to the instructor with the student's legal name as well as "Preferred first name" (if previously entered by you in the Student Profile section of your CIS account, which managed can be managed at any time). While CIS refers to this as merely a preference, I will honor you by referring to you with the name and pronoun that feels best for you in class or on assignments. Please advise me of any name or pronoun changes so I can help create a learning environment in which you, your name, and your pronoun are respected. If you need any assistance or support, please reach out to the Center for Student Access and Resources: `https://studentresources.utah.edu`

English Language Learners: If you are an English language learner, please be aware of several resources on campus that will support you with your language and writing development. These resources include: the Writing Center (`http://writingcenter.utah.edu/`); the Writing Program (`http://writing-program.utah.edu/`); the English Language Institute (`http://continue.utah.edu/eli/`). Please let me know if there is any additional support you would like to discuss for this class.

Undocumented Student Support: Immigration is a complex phenomenon with broad impact—those who are directly affected by it, as well as those who are indirectly affected by their relationships with family members, friends, and loved ones. If your immigration status presents obstacles to engaging in specific activities or fulfilling specific course criteria, confidential arrangements may be requested from the Dream Center. Arrangements with the Dream Center will not jeopardize your student status, your financial aid, or any other part of your residence. The Dream Center offers a wide range of resources to support undocumented students (with and without DACA) as well as students from mixed-status families. To learn more, please contact the Dream Center at 801-213-3697 or visit `dream.utah.edu`.

Veterans: If you are a student veteran, the University of Utah has a Veterans Support Center located in Room 161 in the Olpin Union Building. Hours: M-F 8-5pm.Please visit their website for more information about what support they offer, a list of ongoing events and links to outside resources: `http://veteranscenter.utah.edu/`.

Addressing Sexual Misconduct: Title IX makes it clear that violence and harassment based on sex and gender (which includes sexual orientation and gender identity/expression) is a civil rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, color, religion, age, status as a person with a disability, veteran's status, or genetic information.

If you or someone you know has been harassed or assaulted, you are encouraged to report it to university officials:

Title IX Coordinator & Office of Equal Opportunity and Affirmative Action
801-581-8365
oeo.utah.edu
135 Park Building
201 Presidents' Cir.
Salt Lake City, UT 84112

Office of the Dean of Students
801-581-7066
deanofstudents.utah.edu
270 Union Building
200 S. Central Campus Dr.
Salt Lake City, UT 84112

To file a police report, contact:
Campus Police & Department of Public Safety
801-585-COPS (801-585-2677)
dps.utah.edu
1735 E. S. Campus Dr.
Salt Lake City, UT 84112

If you do not feel comfortable reporting to authorities, the U's Victim-Survivor Advocates provide free, confidential, and trauma-informed support services to students, faculty, and staff who have experienced interpersonal violence.

To privately explore options and resources available to you with an advocate, contact:
Center for Student Wellness
801-581-7776
wellness.utah.edu
328 Student Services Building
201 S. 1460 E.
Salt Lake City, UT 84112

Safety at the U: The University of Utah values the safety of all campus community members. You will receive important emergency alerts and safety messages regarding campus safety via text message. For more safety information and to view available training resources, including helpful videos, visit safeu.utah.edu.

To report suspicious activity or to request a courtesy escort, contact:
Campus Police & Department of Public Safety
801-585-COPS (801-585-2677)
dps.utah.edu
1735 E. S. Campus Dr.
Salt Lake City, UT 84112

Office of the Dean of Students: The Office of the Dean of Students is dedicated to being a

resource to students through support, advocacy, involvement, and accountability. It serves as a support for students facing challenges to their success as students, and assists with the interpretation of University policy and regulations. To contact the Office of the Dean of Students, please email `deanofstudents@utah.edu` or call 801-581-7066. There is more information at `https://deanofstudents.utah.edu`.

Basic Needs Student Support Statement: Success at The University of Utah includes learning about and using available resources. The Basic Needs Collective (BNC) is a coordinated resource referral hub. They educate about and connect students to campus and community resources to help them meet their basic needs. As a central location for resource referrals related to food, housing, health insurance, managing finances, legal services, mental health, etc., any student experiencing difficulty with basic needs is encouraged to contact them. Drop into their office located in the Union basement or schedule with them online for an in-person or virtual visit through their webpage: `https://basicneeds.utah.edu/`.

Semester calendar
(Subject to change!)

Day	Date	Text Section(s)	Topic
Monday	January 6, 2025	—	Hello
Tuesday	January 7, 2025	1.1	Mathematical basics and introduction to limits
Wednesday	January 8, 2025	1.2	More formal discussion of limits
Friday	January 10, 2025	1.3	Limit theorems and results
Monday	January 13, 2025	0.7	Review: trigonometric functions
Tuesday	January 14, 2025	1.4	Limits involving trigonometric functions
Wednesday	January 15, 2025	1.4	Limits involving trigonometric functions
Friday	January 17, 2025	1.5	Limits at infinity; infinite limits
Monday	January 20, 2025	—	No class: MLK Jr. Day
Tuesday	January 21, 2025	1.6	Continuity of functions
Wednesday	January 22, 2025	2.1	Motivations of the derivative
Friday	January 24, 2025	2.2	Fundamentals of the derivative
Monday	January 27, 2025	2.3	Computing basic derivatives
Tuesday	January 28, 2025	2.3	Computing basic derivatives
Wednesday	January 29, 2025	—	Review
Friday	January 31, 2025	—	**Midterm Exam 1**
Monday	February 3, 2025	2.4	Derivatives of trigonometric functions
Tuesday	February 4, 2025	2.5	The chain rule
Wednesday	February 5, 2025	2.5	The chain rule
Friday	February 7, 2025	2.6	Higher order derivatives
Monday	February 10, 2025	2.7	Implicit differentiation
Tuesday	February 11, 2025	2.8	Related rates
Wednesday	February 12, 2025	2.8	Related reates
Friday	February 14, 2025	2.9	Differentials and approximations
Monday	February 17, 2025	—	No class: Presidents' Day
Tuesday	February 18, 2025	3.1	Extrema: Maxima and minima
Wednesday	February 19, 2025	3.2	Monotonicity and concavity
Friday	February 21, 2025	3.3	Local extrema and extrema on open intervals
Monday	February 24, 2025	3.4	Applications
Tuesday	February 25, 2025	3.4	Applications
Wednesday	February 26, 2025	—	Review
Friday	February 28, 2025	—	**Midterm Exam 2**

Day	Date	Text Section(s)	Topic
Monday	March 3, 2025	3.5	Graphing functions with calculus
Tuesday	March 4, 2025	3.5	Graphing functions with calculus
Wednesday	March 5, 2025	3.6	The Mean Value Theorem for derivatives
Friday	March 7, 2025	3.7	Solving equations numerically
Monday	March 10, 2025	—	<u>No class</u>: Spring break
Tuesday	March 11 2025	—	<u>No class</u>: Spring break
Wednesday	March 12, 2025	—	<u>No class</u>: Spring break
Friday	March 14, 2025	—	<u>No class</u>: Spring break
Monday	March 17, 2025	3.8	Antiderivatives
Tuesday	March 18, 2025	3.9	Introduction to differential equations
Wednesday	March 19, 2025	4.1	Introduction to area
Friday	March 21, 2025	4.1	Introduction to area
Monday	March 24, 2025	4.2	The definite integral
Tuesday	March 25, 2025	4.3	The Fundamental Theorem of Calculus
Wednesday	March 26, 2025	4.3	The Fundamental Theorem of Calculus
Friday	March 28, 2025	4.4	The Fundamental Theorem of Calculus
Monday	March 31, 2025	4.5	The Mean Value Theorem for Integrals
Tuesday	April 1, 2025	4.6	Numerical integration
Wednesday	April 2, 2025	—	Review
Friday	April 4, 2025	—	**<u>Midterm Exam 3</u>**
Monday	April 7, 2025	5.1	Area of a plane region
Tuesday	April 8, 2025	5.1	Area of a plane region
Wednesday	April 9, 2025	5.2	Volumes: slabs disks, washers
Friday	April 11, 2025	5.2	Volumes: slabs,disks, washers
Monday	April 14, 2025	5.3	Volumes of revolution: shells
Tuesday	April 15, 2025	5.3	Volumes of revolution: shells
Wednesday	April 16, 2025	5.4	Length of a plane curve
Friday	April 18, 2025	5.4	Length of a plane curve
Monday	April 21, 2025	5.5	Work and fluid force
Tuesday	April 22, 2025	—	Review
Tuesday	April 29, 2025	—	**<u>Final Exam: 10:30am-12:30pm</u>**