Course Outline

College and Career Preparation

Spring, 2023

MATH 031- Mathematics 31
5 credits, 15 hours lectures per week

Topics covered include differential calculus of algebraic functions with applications to problems involving motion, rates of change, optimization and areas; vectors in the plane and in 3-space; matrix algebra; and solutions of systems of linear equations.

Alberta Education Course Equivalency: Mathematics 31
Prerequisite: MATH 30 -1

Instructor
Leni Cherian
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Office Hours
Monday to Friday 12 to 12:50pm

Hours of Instruction

Monday to Friday 9:00 to 11:50 am Room S 218

Required Resources
Calculus: A first course by Stewart, Davison and Ferroni ISBN 0-07-549601-1

Course Outcomes

Upon successful completion of the course, the student shall be able to:

Limits and Rates of Change

- Explain how the idea of a limit arises when we try to find the tangent to a curve
- Explain the limits of a function and their properties and computing limits using graphical and numerical methods
- Determine the limits of polynomial, rational and power functions using limit theorems Use limits to find the slope and equation of a tangent to a curve, velocities and other rates of change.

Derivatives

- Determine derivatives of functions from first principles.
- Determine the derivatives of functions using differentiation rules
- Apply power rule, sum and difference rule, product rule, quotient rule, chain rule to find the derivatives of different functions
- Determine second and higher order derivatives of functions
- Use Implicit Differentiation to find the derivatives of certain algebraic functions

Applications of Derivatives

- Use derivatives to find velocity, acceleration and other rates of change in natural and social sciences.
- Use the rate of change of one quantity to determine the rate of change of a related quantity.

Extreme Values

- Determine the intervals on which a function is increasing or decreasing.
- Determine the absolute maximum and minimum values of functions on a closed interval.
- Use of first derivative test to determine the local maximum and minimum values
- Applications of maximum and minimum problems

Curve Sketching

- Determine the vertical and Horizontal Asymptotes of functions
- Determine where the curve is concave upward and where it is concave downward and find the points of inflection
- Use second derivative test to determine local maximum and minimum values of functions
- Use the information of domain, range, asymptotes, concavity and points of inflection, together with intervals of increase and decrease and maximum and minimum values, to develop a procedure for curve sketching

Derivatives of Trigonometric Functions

- Determine the derivatives of sine and cosine functions and other trigonometric functions
- Determine Inverse trigonometric functions

Differential Equations

- Determine anti derivatives
- Solve differential equations with initial conditions

Area

- Determine the area under a curve
- Find the area between two curves in a particular interval.

Integrals

- Evaluate a definite Integral as limits of sums
- Use fundamental theorem of calculus to determine definite integrals of functions
- Use substitution rule to evaluate definite integrals
- Use integration by parts to evaluate integrals

Evaluation

Assignments	15%
Mid Terms 1 & 2	45%
Final Exam	40%
Total	100%

The minimum pre-requisite for progression is 1.7 (refer to grading system below)

Grading System

Descriptor	4.0 Scale	Percent
	4.0	96 – 100
Excellent	4.0	90 – 95
	3.7	85 – 89
	3.3	81 – 84
Good	3.0	77 – 80
	2.7	73 – 76
	2.3	69 – 72
Satisfactory	2.0	65 – 68
Minimum Prerequisite	1.7	60 – 64
Poor	1.3	55 – 59
Minimum Pass	1.0	50 – 54
Failure	0.0	0 – 49

Topic Outline

Limits and Rates of Change	Chapter 1- Sections 1.1,1.2,1.3,1.4,1.5
Derivatives	Chapter 2- Sections 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8
Applications Of Derivatives	Chapter 3- Sections 3.1, 3.2, 3.3, 3.5
Extreme Values	Chapter 4- Sections 4.1, 4.2, 4.3, 4.4
Curve Sketching	Chapter 5- Sections 5.1, 5.2, 5.3, 5.4, 5.5
Derivatives of Trigonometric Functions	Chapter 7- Sections 7.2, 7.3, 7.5
Differential Equations	Chapter 9- Sections 9.1, 9.2
Area	Chapter 10- Sections 10.1, 10.2
Integrals	Chapter 11- Sections 11.1, 11.2, 11.3, 11.4

Performance Requirements and Student Services
Student Responsibilities

As a student, it is your responsibility to contact the Office of the Registrar to complete the required forms, including the Withdraw Course or Program or a Change of Registration form. Please refer to the important dates listed in the Academic Schedule in the Keyano College credit calendar. The Keyano College credit calendar also has information about Student Rights and the Code of Conduct. It is the responsibility of each student to be aware of the guidelines outlined in the Student Rights and the Code of Conduct Policies.

Student Attendance

Class attendance is helpful for two reasons: First, class attendance maximizes a student's learning experience. Second, attending class is an excellent way to keep informed of matters relating to the course administration (e.g., the timing of assignments and exams). Ultimately, you are responsible for

your learning and performance in this course. It is the responsibility of each student to be prepared for all classes. Absent students are responsible for the material covered in those classes, and students must ensure they are ready for their next class, including completing any missed assignments and notes.

Academic Misconduct

Students are considered responsible adults and should adhere to the principles of intellectual integrity. Intellectual dishonesty takes many forms:

- Plagiarism or the submission of another person's work as their own,
- The use of unauthorized aids in assignments or examinations (cheating),
- Collusion or the unauthorized collaboration with others in preparing work,
- The deliberate misrepresentation of qualifications,
- The willful distortion of results or data,
- Substitution in an examination by another person,
- Submitting unchanged work for another assignment, and
- Breach of confidentiality.

The consequences for academic misconduct range from a verbal reprimand to expulsion from the College. More specific descriptions and details are found in the Student Rights and Code of Conduct section of the Keyano College credit calendar. It is the responsibility of each student to be aware of the guidelines outlined in the Student Rights and Code of Conduct Policies. To ensure your understanding of plagiarism, you may be required to complete the online Understanding Plagiarism tutorial and submit the certificate of completion.

Online Learning

Technology and internet connectivity will impact your online learning experience. You may be required to watch online videos, take online quizzes, or participate in live online classes. Live/virtual courses will be hosted in Microsoft Teams or Zoom. For all course delivery types, you will access your course resources on Keyano's learning management system: Moodle (iLearn). Login in using your Keyano username and password. Keyano College operates in a Windows-based environment and having access to the correct tools for online learning is essential.

Internet Speed

Minimum download and upload speeds of 10 Mbps. Recommended download speeds of 25 Mbps and upload speeds of 10 Mbps (if you are sharing your internet at home). You can check your internet speed with Speedtest by Ookla.

Computer System Requirements

Keyano College software are Windows based.

Minimum Requirements and Recommended Upgrades for Windows (preferred system) and Apple devices These minimum standards are required for a Windows computer/laptop (OS 10 or 11) and a MacIntosh (OS 10.14 or above.
1. Windows 10 Operating System or above 2. 4GB of RAM. Recommended upgrade to 8GB of RAM. 3. 10GB+ available hard drive storage space. Note installing Microsoft Office 365 requires 3GB of available hard drive space. a. Install the Microsoft Office 365 suite (~3GB) ***** 4. Microphone, webcam, and speakers (All modern laptops have these three accessories built-in. However, a headset or earbuds with a microphone is also recommended. 5. Windows has built-in anti-virus/malware software. It is essential to install system updates to keep your device secured regularly. *****Microsoft Office 365 is free to Keyano students.
Tablets, iPads, and Chromebooks are **not** recommended: they may not be compatible with the testing lockdown browsers and Microsoft Office 365.

Computer Software

Students have access to Microsoft Office 365 and Read & Write for free using Keyano credentials.

See Recommended Technology for more information.

Recording of Lectures and Intellectual Property

Students may only record a lecture if explicit permission is provided by the instructor or Accessibility Services. Even if students have permission to record a lecture or lecture materials, students may not share, distribute, or publish any of the lectures or course materials; this includes any recordings, slides, instructor notes, etc., on any platform. Thus, no student is allowed to share, distribute, publish or sell course-related content without permission. It is important to recognize that the Canadian Copyright Act contains provisions for intellectual property. The Academic Integrity Policy provides additional information on Keyano College's expectations from students as members of the intellectual community.

ITS Helpdesk

If you have issues with your student account, you can contact the ITS Helpdesk by emailing its.helpdesk@keyano.ca or calling 780-791-4965.

Specialized Supports
The Student Services Department is committed to Keyano students and their academic success. There is a variety of student support available at Keyano. All student services are available during Keyano business hours: Monday to Friday, 8:30 a.m. to 4:30 p.m. The College is closed on statutory holidays. If you require support outside of regular business hours, please inform the support service team, and they will do their best to accommodate your needs.

Accessibility Services provides accommodations for students living with disabilities. Students with documented disabilities or who suspect a disability can meet with an Access Strategist to discuss their current learning barriers and possible accommodations. Students who have accessed accommodations in the past are encouraged to contact the department to request accommodations for the following semester. Please note that requesting accommodations is a process and requires time to arrange. Contact the department as soon as you know you may require accommodations. For accessibility supports and disability-based funding, please book an appointment by emailing us at: accessibility.services@keyano.ca.

Accessibility Services also provides individual and group learning strategy instruction for all students and technology training and support to enhance learning. You can meet with an Access Strategist to learn studying and test-taking strategies. In addition, you can schedule an appointment with the Assistive Technology Specialist to explore technology tools for learning. Book an appointment today by emailing: accessibility.services@keyano.ca

Wellness Services offers a caring, inclusive, and respectful environment where students can access free group and individual support to meet academic and life challenges. Mental Health Coordinators provide a safe and confidential environment for you to seek help with personal concerns. Our Wellness Navigator offers support with basic needs such as housing, financial and nutritional support, and outside referrals when needed. Wellness Services welcomes students to participate in group sessions that address topics including mindfulness and test anxiety throughout the academic year. Individual appointments can be made by emailing wellness.services@keyano.ca.

Library Services provides students with research, information, and educational technology supports as they engage in their studies. Library staff are available to help you online and in person throughout the semester. Librarians offer individual and small group consultations booked using the online Book A Librarian calendar. The library also provides virtual research and subject guides to help you with your studies. Find the guide that supports your course-related research by viewing the complete list of online Subject Guides. To start your research and access citation guides (APA, MLA, Chicago, or IEEE), visit the Research Help page. The library's collections (including print and online materials) are searchable using OneSearch. The library offers a Loanable Technology collection to support students accessing and using technology. For an up-to-date list of technology available for borrowing, visit the library's Loanable Technology webpage. For a detailed list of library resources and services, go to www.keyano.ca/library. For all inquiries, please email askthelibrary@keyano.ca or chat with us online.
The **Academic Success Centre** at Keyano College (CC-119) provides **free** academic support services to registered students, such as tutoring, writing support, facilitated study groups, workshops, and study space. Academic Content Specialists are available in Mathematics, Science, Trades, Power Engineering, Upgrading/College Prep, Human Services, English, Humanities, and more. Students are encouraged to visit the Academic Success Centre to discuss study strategies and academic concerns. For additional information, please email Academic.Success@keyano.ca.

The **Academic Success Coach** is located in the Academic Success Centre and works with students to develop academic success plans, time management skills, study strategies, and homework plans. For additional information, please email Academic.Success@keyano.ca.