

Calculus 12

January to April 2022 Period 4

Instructor: Mr. Sheldon

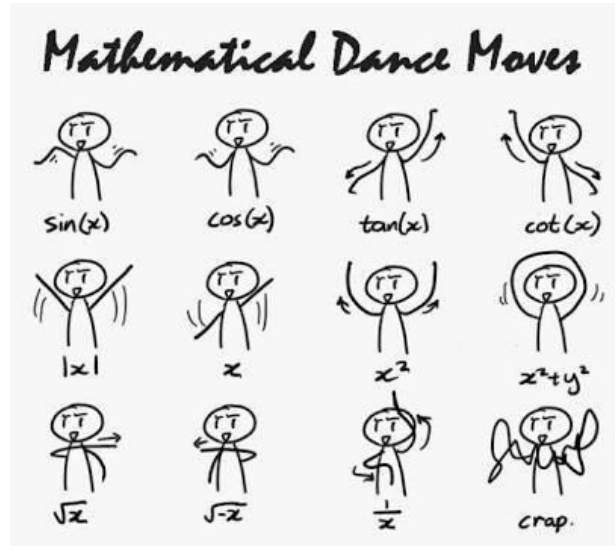
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Room: 116

About the Course:

Calculus is a fascinating, powerful, and challenging topic. It is the mathematics of change. While much of what we do in Mathematics is somewhat artificial, Calculus is the mathematic of real life. For example:

- In algebra we find the slopes of straight lines. In calculus we find the slopes of complex curves.
- In algebra we find the area of triangles and rectangles. In calculus we find the areas under curves.
- In algebra we deal with constant speeds and motion. In calculus we deal with varying speeds and motion.
- Algebra is more regular and less real. Calculus is more real and less regular.



There are three basic parts to Calculus:

- Limits: The concept of a limit is foundational to calculus. It is the tool we use to precisely describe how a function approaches a value.
 - a. left and right limits
 - b. limits to infinity
 - c. continuity
- Derivatives – Differential calculus develops the concept of instantaneous rate of change.
 - a. rate of change
 - b. differentiation rules
 - c. higher order, implicit
 - d. applications
- Integrals / Antiderivatives – Derivatives and integrals are inversely related. Integral calculus develops the concept of determining a product involving a continuously changing quantity over an interval.
 - a. approximations
 - b. fundamental theorem of calculus
 - c. methods of integration
 - d. applications

Marks Breakdown:

Homework/Participation	10%
Quizzes	30%
○ Approximately one or two quizzes per week.	
Tests/Projects	40%
○ Chapter Tests	
○ Midterm and Final Exam	
Projects / Assignments	20%
○ You will be assigned two research and presentation projects	
○ Other major assignments will be included in this category	

Textbook

Larson, Hostetler, Edwards *Calculus of a Single Variable (Sixth Edition)*

You will be assigned a textbook on the first day in class. Additional material will be uploaded to Teams.

Teams

You have all been added to a class Team where you can access notes, assignments, and announcements. You can send me messages through Teams if you have any questions.

Course Plan (subject to change)

Chapter 0: Review of Pre-Calculus Jan 10 - 14

- Lesson 1 – Introduction to Calculus
- Lesson 2 – Review of Functions
- Lesson 3 – Graphing Calculators
- Lesson 4 – Composition
- Lesson 5 – Some Common Functions
- Lesson 6 – Inverse Functions
- Lesson 7 – Exponential & Logarithmic Functions

Chapter 1: Limits and Rates of Change Jan 17 - 21

- Lesson 1 – Introduction to Limits
- Lesson 2 – Properties of Limits
- Lesson 3 – Limits Involving Infinity
- Lesson 4 – Continuity
- Lesson 5 – Applications of Limits

Chapter 2: Derivatives Jan 24 – Feb 4

- Lesson 1: The Derivative
- Lesson 2: Rules of Differentiation
- Lesson 3: Trigonometric Derivatives and The Chain Rule
- Lesson 4: Derivatives of Exponential, Log, and Inverse Trig Functions
- Lesson 5: Implicit Differentiation

Chapter 3: Applications of Derivatives Feb 7 - 18

- Lesson 1: Analyzing Functions Part I: Curve Sketching

Lesson 2: Analyzing Functions Part II: Maximums and Minimums
Lesson 3: Applied Maximum and Minimum Problems
Lesson 4: Distance, Velocity, Acceleration and Rectilinear Motion
Lesson 5: Related Rates
Lesson 6: The Mean-Value Theorem

Midterm Exam February 21-25 Covers chapters 1 - 3

Chapter 4: Integration Feb 28 – March 18

Lesson 1: Area Approximation and Riemann Sums
Lesson 2: Introduction to the Definite Integral
Lesson 3: The Fundamental Theorem of Calculus
Lesson 4: Integrals and Antiderivatives
Lesson 5: Integration by Substitution
Lesson 6: The Definite Integral

Chapter 5: Differential Equations March 21 - 25

Lesson 1: Differential Equations – An Introduction
Lesson 2: Initial Value Problems, Slope Fields, and Euler’s Method
Lesson 3: Linearization and Newton’s Method
Lesson 4: Numerical Approximation Methods with Integrals

Chapter 6: Application of Integrals March 28 – April 8

Lesson 1: Finding the Area Under and Between Curves
Lesson 2: Volume by Discs (Slicing)
Lesson 3: Volume by Shells
Lesson 4: Work
Lesson 5: Average Value of a Function and Rectilinear Motion Revisited

Final Exam April 11-13 Covers chapters 1 - 6

Equipment Needed:

Notebook, pen, paper, scientific calculator

Participation:

Participation will be tracked weekly. You will receive your weekly mark if you answer questions, offer suggestions, or otherwise participate in activities. Phone usage and sleeping during class will count against participation marks. You can earn participation marks by handing your phone in to me at the beginning of class.

Homework:

Homework will be tracked and logged. Full points will be given for on-time and complete homework. Half points will be given for late or incomplete work.

Classroom Expectations:

Bullying and harassment of other students will not be tolerated in class.

All work must be your own. Cheating and plagiarism will result in a mark of zero for all students involved.