



Forman Christian College, Lahore
(A Chartered University)
Spring 2022

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Office Hours: Mo, Wed & Fri: 01:00 pm– 02:30 pm

Tuesday & Thursday: 11:30 am – 01:00 pm

Course Information:

Calculus I, MATH 102 (B), 3 credits, Class Room: S-410

Lectures Time: Monday, Wednesday & Friday (12:00 - 12:50)

Prerequisite: MATH-101 / A-level / FSc pre-engineering

Text Book: “CALCULUS” by Howard Anton, Irl Bivens and Stephen Davis, 10th edition
https://www.academia.edu/34762815/Calculus_10th_edition_H._Anton

Reference Book: Essential Calculus: Early Transcendentals by James Stewart.

Course Contents: Course contents include, but not limited to the following:

Functions, graph of functions, translation, stretching and compressing graphs, limits, continuity and differentiability, differentiation and its basic rules, indeterminate forms, L'Hopital's rule, integration and its techniques, fundamental theorem of calculus, evaluating definite integral.

Course Objectives: The course will help students to:

- Place the difference between functions and graphs.
- Work with functions represented in a variety of ways: graphical, numerical, analytical, or verbal, and understand the connections among these representations.
- Understand the meaning of the derivative in terms of a rate of change and local linear approximation.
- Understand the reasons that lead to the concepts of limit, derivation, and integration of functions and that how these concepts are interrelated.
- Understand the relationship between the derivative and the definite integral as expressed in the Fundamental Theorem of Calculus.
- Extend the knowledge of methods and tools, used in calculus, to other branches of science, particularly in physics.
- Familiar with various derivation and integration techniques.
- Develop an appreciation of calculus as a coherent body of knowledge and as a human accomplishment.

Learning Outcomes: Upon successful completion of this course, students will be able to:

- Understand the basics of function; its domain, range, intercepts, and graph; functions operations; composition function; inverse function; and function transformations.
- Compute limits by graphs, and compute limits by techniques.
- Compute limits at infinity of rational functions, and limits in indeterminate forms by a repeated use of L'Hôpital's rule.
- Know derivatives of power, trigonometric, exponential, logarithmic and inverse trigonometric functions.
- Know the basic rules of differentiation and use them to find derivatives of products and quotients.
- Know the chain rule and use it to find derivatives of composite functions.
- Find tangents and normals to graphs of functions.
- Understand the concept of indefinite integral as anti-derivative.
- know standard indefinite integrals and basic rules of indefinite integration.
- Evaluate integrals by substitution.
- Evaluate integrals of rational functions by partial fractions.
- Evaluate integrals by a repeated use of integration by parts.
- Understand the concept of definite integral and know the basic properties of definite integrals.

Course Requirements:

- **Teaching Mode:** The mode of teaching will be either fully in-person (for all students), or online, or basic blended model (in two groups), subject to the condition and the university instructions.
- **Attendance:** Students are expected to attend every class (both in person and in online classes). Student whose attendance is less than 70% will not be allowed to take the final exam. Students must arrive at class on time, should remain in class for the entire class period and mobile phone should be switched off or on silence. Note that there is 10 marks for attendance and behavior, if a student arrives more than 10 minutes late or leaves class during lecture or uses mobile in class, he/she will be marked absent for that day.
- **Assessment:** Course assessment will be through **quizzes, attendance and behavior, midterm, and final exam**. Quizzes, mid term exam and final exam will be conducted on campus for all students. There is no make up of any quizzes, but **best 3 out of 4** will be counted. Make up for midterm and final exam is possible only under extremes cases if student provides strong documentary evidence within 3 days, but in that case, there will be a 0-20% deduction in marks depending upon case to case basis.
- **Academic dishonesty or cheating:** Academic dishonesty or cheating will result in zero points and will be referred to AIC (Academic Integrity Committee) at FCC for necessary action.

Course Evaluation: Grading will be based on the following criteria:

Quizzes (4)	20 %
Attendance and behavior	10 %
Mid Term	30 %
Final Exam	40 %

Week	Topics	Assessments
1 March 7, 9, 11	<ul style="list-style-type: none"> ❖ Discussion of Course plan and Overview of Course Syllabus ❖ Functions: Functions, examples, and their domains ❖ Operations on Functions and Composition of Functions ❖ Inverse Function 	
2 March 14, 16, 18	<ul style="list-style-type: none"> ❖ Graphs of Functions, Translation, Reflection, Stretching and Compressing Graphs ❖ Limits: Finding Limits by Graphs 	
3 March 21, 25	<ul style="list-style-type: none"> ❖ Computational Techniques of Limits 	Quiz 1 March 25 (Fri)
4 March 28, 30 April 01	<ul style="list-style-type: none"> ❖ Limits of Piecewise Functions ❖ Limits of Trigonometric Functions ❖ Finding Limits at Infinity Using Graphs 	
5 April 04, 06, 08	<ul style="list-style-type: none"> ❖ Computing Limits at infinity ❖ Continuity ❖ The Derivative Function, Differentiability, Equation of Tangent Line 	
6 April 11, 13	<ul style="list-style-type: none"> ❖ Techniques of Differentiation 	Quiz 2 April 13 (Wed)
7 April 20, 22	<ul style="list-style-type: none"> ❖ Derivative of Trigonometric functions, The Chain Rule. 	
8 April 25, 27, 29	<ul style="list-style-type: none"> ❖ Higher Derivatives, and Derivative of Exponential and Logarithmic Functions 	Mid Term April 29 (Fri)
9 May 09, 11, 13	<ul style="list-style-type: none"> ❖ Implicit Differentiation ❖ Logarithmic Differentiation ❖ Derivative of Inverse Trigonometric Functions 	
10 May 16, 18, 20	<ul style="list-style-type: none"> ❖ L'Hopital's Rule; Indeterminate Forms 	
11 May 23, 25, 27	<ul style="list-style-type: none"> ❖ The Indefinite Integral and Techniques of Integration ❖ Integrating Powers of Trigonometric Functions 	Quiz 3 May 27 (Fri)
12 May 30 June 01, 03	<ul style="list-style-type: none"> ❖ Integrating Product of Trigonometric Functions ❖ Integration by Parts 	
13 June 06, 08, 10	<ul style="list-style-type: none"> ❖ Integration by simple substitution ❖ Integration by Trigonometric substitution 	
14 June 13, 15, 17	<ul style="list-style-type: none"> ❖ Deriving Reduction Formulas ❖ Integrating Rational Functions by Partial Fractions 	
15 June 20, 22, 24	<ul style="list-style-type: none"> ❖ The definite Integral, The First Fundamental Theorem of Calculus 	Quiz 4 June 24 (Fri)