

Syllabus / Course Outline Spring 2023

Course Name: Calculus I		
Course Code: MATH 102	Course Type:	Course Credits: 3
Class Timings: Mon, Wed, Fri: 12:00 - 12:50	Section: B	Student Meeting Hours/ Office Hours: Mon, Wed, Fri: 01:00 – 02:30 Tuesday: 12:00 – 02:30
Instructor Name: Dr. Shabnam Malik		
<p>A Note from the Instructor:</p> <ul style="list-style-type: none"> • Students are expected to attend every class. Student whose attendance is less than 70% won't 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 behaviour, 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. • 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 extreme 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 will result in zero points and will be referred to AIC (Academic Integrity Committee) at FCC for necessary action. 		
<p>Instructor Contact Details Email: shabnammaik@fccollege.edu.pk Office: S-351, Armacost Science Building Office Hours: Mon, Wed, Fri: 01:00 – 02:30 and Tuesday: 12:00 – 02:30 Guidelines for contacting instructor: Students may visit during office hours for queries/discussion, and may also send email.</p>		
<p>Course Description: Pre-requisites : MATH-101 / A-level / FSc pre-engineering Mode of Instruction: In class (face to face) teaching and discussions</p>		
<p>Main Mode of Instruction: Moodle and face to face Technology Requirements: Students need to access their Moodle accounts for course materials.</p>		

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.

Student Learning Outcomes (SLOs): 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.
- ❖ Understand derivatives of power, trigonometric, exponential, logarithmic and inverse trigonometric functions.
- ❖ Understand the basic rules of differentiation and use them to find derivatives of products and quotients.
- ❖ Understand 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.
- ❖ Understand standard indefinite integrals and basic rules of indefinite integration.
- ❖ Perform integrals by substitution.
- ❖ Perform integrals of rational functions by partial fractions.
- ❖ Perform integrals by a repeated use of integration by parts.
- ❖ Understand the concept of definite integral and know the basic properties of definite integrals

Course Content and Activities Schedule: 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

Week	Topics	Assessments
1 Feb 13, 15, 17	<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 Feb 20, 22, 24	<ul style="list-style-type: none"> ❖ Graphs of Functions, Translation, Reflection, Stretching and Compressing Graphs ❖ Limits: Finding Limits by Graphs 	
3 Feb 27 March 01, 03	<ul style="list-style-type: none"> ❖ Computational Techniques of Limits 	Quiz 1 March 03 (Fri)

4 March 06, 08, 10	<ul style="list-style-type: none"> ❖ Limits of Piecewise Functions ❖ Limits of Trigonometric Functions ❖ Finding Limits at Infinity Using Graphs ❖ Computing Limits at infinity 	
5 March 13, 15, 17	<ul style="list-style-type: none"> ❖ Continuity ❖ Differentiation: The Derivative Function, Differentiability, Equation of Tangent Line ❖ Techniques of Differentiation 	
6 March 20, 22, 24	<ul style="list-style-type: none"> ❖ Derivative of Trigonometric functions, The Chain Rule. ❖ Higher Derivatives, and Derivative of Exponential and Logarithmic Functions 	
7 March 27, 29, 31	<ul style="list-style-type: none"> ❖ Implicit Differentiation ❖ Logarithmic Differentiation 	Quiz 2 March 29 (Wed)
8 April 03, 05	<ul style="list-style-type: none"> ❖ Derivative of Inverse Trigonometric Functions ❖ L'Hopital's Rule; Indeterminate Forms 	
9 April 12, 14	<ul style="list-style-type: none"> ❖ (...continued) L'Hopital's Rule; Indeterminate Forms 	Mid Term April 14 (Fri)
10 April 17, 19	<ul style="list-style-type: none"> ❖ Integration: The Indefinite Integral and Techniques of Integration 	
11 April 28	<ul style="list-style-type: none"> ❖ (...continued) The Indefinite Integral and Techniques of Integration 	
12 May 03, 05	<ul style="list-style-type: none"> ❖ Integrating Product of Trigonometric Functions 	
13 May 08, 10, 12	<ul style="list-style-type: none"> ❖ (...continued) Integrating Product of Trigonometric Functions ❖ Integration by Parts 	
14 May 15, 17, 19	<ul style="list-style-type: none"> ❖ Integration by simple substitution ❖ Integration by Trigonometric substitution 	Quiz 3 May 15 (Mon)
15 May 22, 24, 26	<ul style="list-style-type: none"> ❖ (...continued) Integration by Trigonometric substitution ❖ Deriving Reduction Formulas 	
16 May 29, 31 June 02	<ul style="list-style-type: none"> ❖ Integrating Rational Functions by Partial Fractions ❖ The definite Integral, The First Fundamental Theorem of Calculus 	
17 June 05, 07, 09	<ul style="list-style-type: none"> ❖ (...continued) The definite Integral, The First Fundamental Theorem of Calculus ❖ Quiz 4 	Quiz 4 June 09 (Fri)

Reading References:

- ❖ "CALCULUS" by Howard Anton, Irl Bivens and Stephen Davis, 10th edition
- ❖ Essential Calculus: Early Transcendentals by James Stewart.

Course Requirements:

- **Class Participation**
Students are expected to participate in the class discussion and problem-solving sessions
- **Quizzes**
There will be 4 quizzes and best 3 will be counted.
- **Mid Term and Final Exam**

The breakup is as follows:

Attendance and Behaviour:	10 %
Quizzes:	20 %
Midterm exam:	30 %
Final term exam:	40 %
TOTAL	100%

Missed Assignments/Quiz/Make-Ups

- There will be no make-up of missed assignment and Quiz.

Attendance Policy:

- At least 70 %

Classroom Participation:

- Students are expected to participate in the class discussion and problem-solving sessions

Grade Determination & Course Assessment as per FCC Policy:

- There will be absolute grading in the course as per department Policy.

Grading Legend:

Below is the grading legend of FCCU (published in all catalogs and available on the FCCU website)

Grade	Point Value	Numerical Value	Meaning
A	4.00	93-100	Superior
A-	3.70	90-92	
B+	3.30	87-89	Good
B	3.00	83-86	
B-	2.70	80-82	
C+	2.30	77-79	Satisfactory
C	2.00	73-76	
C-	1.70	70-72	
D+	1.30	67-69	Passing
D	1.00	60-66	
F	0.00	59 or below	Failing