Lahore University of Management Sciences

MATH 100A- Boot Camp
Pre Fall 2022-2023

Instructor(s)	Mohsin Ali
Room No.	9-155
Office Hours	6:30 PM to 7:30 PM
Email	mohsin_ali@lums.edu.pk
Secretary/TA	Shazia Zafar, Noreen Sohail
Course URL (if any)	https://sigma.lums.edu.pk/webwork2

Course Basics					
Dates	18 August 2022 – 28 August 2022				
Days	Mon,Tue,Wed,Th,Fri				
Time	5:00 PM – 6:30 PM				
Lecture(s)	Lectures based on everyday	Duration	90 min	Mode	Online
Open for students category	a) Students with other than mathematics background such as bio etc. b) Students who scored fewer grades in mathematics, for example, B or lower grades in A-levels/FSc				
Sections/Strength	One section, 35 each (Tentative)				

Learning Outcomes	
	Students will learn to: Perform common operations on polynomials Find zeros of polynomials and factor polynomials Solving the quadratic inequalities and equations Manipulate functions algebraically Graph common functions Perform common calculations with complex numbers Use the logarithm and exponential functions and their real life applications Use the laws for exponentials and logarithms of real numbers Find values of trigonometric functions Relate basic trigonometric functions to the unit circle Manipulate trigonometric identities Solve problems involving right-angle triangles Apply the Laws of Sines and Cosines Real-life applications of the trigonometric and pre-calculus

Grading Breakup and Policy
Assignment(s): *Online Assignments on webwork* https://sigma.lums.edu.pk/webwork2   Terminal Examination: paper bases exam

	COURSE OVERVIEW		
Lecture(s)	Topics	Recommended Readings*	Objectives/ Application
1-2	Fundamentals: Integers, Rational and Irrational, Real, and Complex numbers. Absolute value, exponent and radicals. Algebraic expressions, equation and straight lines.	1.1-1.5, 1.8-1.11	Understanding of the real line and absolute value function. Expressing the relationship between quantities through numbers. Identify and use properties of exponents. Solving the linear equation (straight line),
2-3	Functions and Their Graphs: Introduction to functions and their graphs. Graph transformations, Properties of functions, Combining Functions, One-to-One Functions and Their Inverses.	2.1-2.2, 2.6-2.8	Learn the basic concept of function. Learn to draw/sketch of graph functions and use the tests of symmetry about the x-axis, y-axis and the origin. Learn properties of functions.
4	Linear and Quadratic Functions: Linear functions and their properties, quadratic functions and their properties. Polynomial and Rational Functions: Polynomial Functions, Dividing Polynomials, Rational functions, Real and complex Zeros of Polynomials, Fundamental Theorem of Algebra, remainder theorem, factor theorem, Polynomial and rational inequalities.	3.1-3.7	Determining the key feature of the Linear and quadratic functions. Graph Linear Functions, Use Average Rate of Change to Identify Linear Functions, Determine Whether a Linear Function Is Increasing, Decreasing, or Constant, learn to solve inequalities involving quadratic functions.
			Modeling the polynomial functions to find of the extrema of the functions. Understand the concept of rational functions. Finding the characteristics such as asymptotes of the rational function and their graphs. Learn to use remainder theorem, factor theorem, fundamental theorem of algebra and the conjugate roots theorem.
5	Exponential and Logarithmic Functions: Exponential functions, the natural exponential function, logarithmic functions and their properties, laws of logarithms, Composition, inverse functions, logarithmic and exponential equations.	4.1-4.5	Defining the exponential functions and their application of growth and decay. Understand the laws of logarithmic function with change of base. Contemplate problems involving application of logarithmic functions.
6-7	Trigonometric Functions: Trigonometric functions via the unit circle; right triangle trigonometry; basic properties and graphs of trigonometric functions, trigonometric functions of angles, inverse trigonometric functions and right triangles.	5.1-5.5 6.2-6.4	Finding the relationship between degree and radian measure Linkage of sin, cosine, and tangent through the unit circle. And finding their values of reference angles $0, \frac{\pi}{6}, \frac{\pi}{4}, \frac{\pi}{3}, \frac{\pi}{2}$ and their multiples. Graph the trigonometric functions and identify their key features such as period, amplitude, domain, range and zeros.
	Analytic Trigonometry and Application: trigonometric equations; trigonometric identities; sum and difference formulas; double-angle and half-angle	6.5,6.6, 7.1-7.5.	Learn the basic trigonometric identities. Use sum, difference, half angle and double angle identities. Define and graph trigonometric functions and their inverses. Learning right
	formulas; product-to-sum and sumto-product formulas, law of sine, law of cosine.		angled and non-right angled geometry Using laws of sine and cosine.

8 (optional)	Sequences and Series: Sequences and Summation Notation, Arithmetic Sequences, Geometric Sequences, Mathematical Induction, The Binomial Theorem.	12.1-12.3, 12.5,12.6	Learn to write the First Several Terms of a Sequence, Write the Terms of a Sequence Defined by a Recursive Formula, Find the Sum of a Sequence. Find a Formula for an Arithmetic and Geometric Sequences. Application of binomial theorem and mathematical induction

Textbook(s)/Supplementary Readings

Textbook:
  ∗ Precalculus, Mathematics for Calculus by James Stewart, Lothar Redlin, Saleem Watson. (7th edition)

Online Notes:
- **https://openstax.org/details/books/precalculus**
- **https://math.libretexts.org/Special:Search?qid=&fpid=230&fpth=&query=precalculus&type=wiki.**
- https://tutorial.math.lamar.edu/Classes/Alg/Alg.aspx

Supplementary Readings:
- Precalculus: Enhanced with Graphing Utilities, 9th edition. By M. Sullivan & M. Sullivan, III.
- Precalculus with unit-circle trigonometry by David Cohen.

Supplemental Websites:
- Khan Academy is a free resource. It may require you to set up an account.
- Purple Math has many lessons for free. However, Purple Math Plus requires you to enroll in monthly or yearly plan.
- S.O.S. Mathematics is a free resource.
- West Texas A & M University Virtual Math Lab is a free online tutorial.