COMSATS University Islamabad

Registrar Secretariat, Academic Unit (PS)
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No: CUI-Reg/Notif-2194/22/2269

September 2, 2022

NOTIFICATION

Academic Council in its 34th meeting held on July 21, 2022 on the recommendation of 28th meeting of the Board of Faculty of Science, approved the following Deficiency courses for all those students who have pre-medical (appeared/passed) background at intermediate level for the undergraduate program of the Department of Computer Science, effective from Fall 2022:

Sr. #	Course Code	Course Name	Credit Hours
1.	MTH091	Pre-Calculus I	3(3, 0)
2.	MTH092	Pre-Calculus II	3(3, 0)

Muhammad Hanif
Deputy Registrar

Encl: (02 Page)

Distribution:
1. All Directors, CUI System
2. Dean, Faculty of Science, CUI
3. Controller of Examinations, CUI
4. In-charge Academics, CUI Islamabad Campus
5. Chairperson, Department of Mathematics, CUI
6. Chairperson, Department of Computer Science, CUI
7. All HoDs, Department of Mathematics, CUI
8. All HoDs/Incharges of Academics/Examinations Sections, CUI System
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11. Internal Distribution (Academic Unit), Registrar Office, CUI

CC:
1. PS to Rector
2. PS to Registrar

Course Code: MTH091
Course Title: Pre-Calculus I
Credit hours: 3(3, 0)

Course Objectives:
This course will enable the students to:
- Understand the basic concept of set theory
- Learn about the functions and their properties
- Learn how to find the optimized solution of various types of functions
- Learn several techniques to find the solution of a system of equations
- Understand the basic concept of matrix and matrix notations
- How to perform matrix operations and use matrices to solve problems
- Basic concept of determinant, how to find the determinant of a matrix and properties of determinant
- Understand the basic idea of trigonometry and trigonometric identities
- Learn about the basic concept of conic sections and equations in parametric and polar form
- Learn basic trigonometric functions, inverse trigonometric functions and solving trigonometric equations

Contents:
Defining set, various types of set representation and operations, relation and function, graphical transformation of one and two dimensional functions, properties of functions, composition and inverses of functions, domain and range of the functions, maximum and minimum values of functions, increasing and decreasing functions, zeros and intercept of functions, piecewise functions, continuity and discontinuity of functions, polynomials and rational functions, polynomial long division and synthetic division, solution of rational functions, absolute valued function, properties of absolute valued functions, asymptotes (horizontal, vertical and oblique), exponential functions and their properties, logs functions and their properties, systems of two equations and two unknowns, systems of three equations and three unknowns, matrix algebra (add, subtract and multiply matrices), row operations and row echelon forms, augmented matrices, determinant of matrices (2 x 2 and higher order matrices), Cramer's rule, inverse matrices, series and sequences, trigonometry, angles in radians and degrees, right triangle trigonometry, law of cosines & sines, area of triangle, graphs of other trigonometric functions , graphs of inverse trigonometric functions, basic trigonometric identities (pythagorean, sum and difference, double, half, and power reducing), trigonometric equations, general form of a conic, parabolas, circles, ellipses, hyperbolas, degenerate conics, polar and parametric equations, polar and rectangular coordinates.

Recommended Books:
- Textbook of Algebra and Trigonometry Class XI, Punjab Textbook Board (PTB) Lahore, Pakistan.
- Calculus and Analytic Geometry, MATHEMATICS 12 (Mathematics FSc Part 2 or HSSC-II), Punjab Text Book Board Lahore, Pakistan

References Material:
- Gilbert, S. S., B. C. Andy and B. Andrew, B. 2005. Linear Algebra and Its Applications. 4th Ed. Thomson Brooks/Cole, Belmont, CA, USA.
- Chung, S. K. 2014. Understanding basic calculus. Create Space Independent Publishing Platform, 173-175.
- Howard, Anton, IrlBivens, Stephen Davis, Calculus, 10th Ed, 2011, John Wiley & Sons, Inc. (1318 Pages)

Course Code: MTH092
Course Title: Pre-Calculus II
Credit hours: 3(3, 0)

Course Objectives:
This course will enable the students to:
- Understand the basic concept of Complex numbers and its arithmetic properties
- Learn about the idea of sequence and series, and their properties
- Learn about Permutations and Combinations, Basic Probability
- Understand the basic concept of Limits of functions, and its properties
- Understand the basic concept of continuity and discontinuity of functions, and their properties
- Understand the concept of derivatives, formulas and properties related to derivative
- Under the concept of Increase, Decrease, Concavity, Relative Extrema, Absolute Maxima and Minima
- Understand the Basic definitions of definite and indefinite Integrals,
- Learn about the Fundamental Theorem of Calculus
- Learn how to Evaluate Definite Integrals by Substitution
- Learn how to Evaluate the integral of Logarithmic and Other Functions

Contents:
Complex numbers, arithmetic with complex numbers (add, subtract, multiply and divide complex numbers), trigonometric polar form of complex numbers, De Moivre's theorem and nth roots, recursion, arithmetic and geometric sequences, sigma notation, arithmetic series, geometric series (sum infinite and finite geometric series and categorize geometric series), counting with permutations and combinations, basic probability, binomial theorem, limit notation, graphs to find limits, tables to find limits, substitution to find limits, rationalization to find limits, one sided limits and continuity, instantaneous rate of change, tangent lines and rates of change, the derivative function, introduction to techniques of differentiation, the product and quotient rules, derivatives of trigonometric functions, the chain rule, derivatives of logarithmic functions, derivatives of exponential and inverse trigonometric functions, increase, decrease, and concavity, relative extrema, absolute maxima and minima, an overview of the area problem, area under a curve, the indefinite integral, integration by substitution, the definition of area as a limit; sigma notation, the definite integral.

Recommended Books:.
- Textbook of Algebra and Trigonometry Class XI, Punjab Textbook Board (PTB) Lahore, Pakistan.
- Calculus and Analytic Geometry, MATHEMATICS 12 (Mathematics FSc Part 2 or HSSC-II), Punjab Text Book Board Lahore

References Material:
- Mark J. Christensen, Computing for Calculus, 1st Edition, Academic Press, (1st January 1981), 240pages, ISBN: 9781483271088.
- Lay, L. D. 2015. Probability and Statistics for Engineering and the Sciences, 9th Ed. Cengage Learning, Boston, MA, USA.
- Howard, Anton, Irl Bivens, Stephen Davis, Calculus, 10th Ed, 2011, John Wiley & Sons, Inc. (1318 Pages)