

Syllabi for Comprehensive Examination of Eligible Ph. D Scholars

(Only for the Courses relating to Research Domains for both Full Time & Sponsored Part Time)

Department: Chemistry

1) Research/Specialization Group: 1

(Name of the Group): Biophysical Chemistry

Course Code: CH 701 [Analytical Methods in Chemistry] [Marks 30]

Syllabus Content:

Statistical Analysis - Evaluating Data Significant figures, types of error, sources of errors and their effect upon the analytical results, precision, accuracy, mean deviations and standard deviation, statistical treatment of analytical data, method of least squares and methods for reporting analytical data.

Thermal Methods - Theory, instrumentation and applications of thermogravimetric analysis (TGA), differential thermal analysis (DTA), differential scanning calorimetry (DSC), thermometric titrations.

Optical Methods - Atomic absorption spectroscopy, steady state and time resolved fluorescence spectrometry, linear and circular dichroism, X-ray methods: X-ray absorption and X-ray diffraction, photoelectron spectroscopy, scanning electron microscopy (SEM), transmission electron microscopy (TEM) and Raman spectroscopy.

Course Code: CY 533 [Biochemistry and Medicinal Chemistry] [Marks 40]

Syllabus Content:

Peptides - Amino acids, polypeptide and protein structure, biosynthesis of amino acids, ribosome, mechanism of protein synthesis, sequencing of amino acids in polypeptides, introduction to protein folding problems.

Nucleic acids - Classifications, nucleotides structure and their functions, biosynthesis of nucleotides, replication of DNA and RNA transcription

Course Code: HS 710 [Research Methodology] [Marks 30]

Syllabus Content:

Fundamentals of Research - Meaning and Concepts of Research; Characteristics and Objectives of Research; Criteria of Good Research; Languages of Research; Types of Research; Psychological Tips; Motivation in Research; The Scholar and the Mentor; Institute Rules and Guidelines

Research Methods and Approaches - Orientation to Basic Research Methods and Approaches; Research Methods; Research Approaches; Qualitative and Quantitative Research; Which Methods and Approaches to Choose? Current Trends in Research

Scholarly Writing - Characteristics of Scholarly Writing; Standard Guidelines; Critical Reviews; Research Proposals; Research Reports; Thesis/Dissertations; Research Papers; Impact Factor of Journals; Citation and Acknowledgement; Plagiarism and Self-Plagiarism; Reproducibility and Accountability

2) Research/Specialization Group: 2

(Name of the Group): Theoretical Chemistry

Course Code: CH 701 [Analytical Methods in Chemistry] [Marks 30]

Syllabus Content:

Statistical Analysis - Evaluating Data Significant figures, types of error, sources of errors and their effect upon the analytical results, precision, accuracy, mean deviations and standard deviation, statistical treatment of analytical data, method of least squares and methods for reporting analytical data.

Thermal Methods - Theory, instrumentation and applications of thermogravimetric analysis (TGA), differential thermal analysis (DTA), differential scanning calorimetry (DSC), thermometric titrations.

Optical Methods - Atomic absorption spectroscopy, steady state and time resolved fluorescence spectrometry, linear and circular dichroism, X-ray methods: X-ray absorption and X-ray diffraction, photoelectron spectroscopy, scanning electron microscopy (SEM), transmission electron microscopy (TEM) and Raman spectroscopy.

Course Code: HS 710 [Research Methodology] [Marks 30]

Syllabus Content:

Fundamentals of Research - Meaning and Concepts of Research; Characteristics and Objectives of Research; Criteria of Good Research; Languages of Research; Types of Research; Psychological Tips; Motivation in Research; The Scholar and the Mentor; Institute Rules and Guidelines

Research Methods and Approaches - Orientation to Basic Research Methods and Approaches; Research Methods; Research Approaches; Qualitative and Quantitative Research; Which Methods and Approaches to Choose? Current Trends in Research

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Course Code: CY 531/CY 536 [Research Methodology] [Marks 40]

Chemical Kinetics: Rate of reactions, kinetics and mechanism, rate laws, elementary reactions, consecutive reactions, steady state approximation, kinetic isotope effect, chain reactions, kinetics of gas phase reactions

Reaction Dynamics: Arrhenius theory; collision theory, activated complex theory, Concept of molecular dynamics: Phase space, number of states, density of states. Force field: bonded and non bonded interactions

Introduction to Programming Language in Scientific Computing: Elements of computational programming, basic program structure, data types, logical and arithmetic expressions, loops and control statements, arrays, input/output statements, format specifications, file processing, functions, subroutines and applications.

Numerical Methods: Curve fitting: least square fit algorithm. Newton-Raphson method, Bisection method. Numerical integration: Trapezoidal and Simpson's rules. Numerical differentiation: forward, backward and centred differencing. Gauss-Jordan elimination. Numerical solutions of ordinary differential equations using Euler, modified Euler and fourth order Runge-Kutta method.

Signatures and Names of DRC Members:

1.

BB *Colombo*

2.

3.

4.

Gov

5.

6.

Amal
24/07/23
Signature of DRC Chairman
Date