School of Applied Sciences

KIIT Deemed to be University, Bhubaneswar-24

Programme Outcomes, Programme Specific outcomes and Course Outcomes

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Programme Outcomes

PO 1:Conceptual knowledge : Creating a strong foundation on theory, and explore the applications that underlies theories and models related to day to day problems.
PO 2:Problem analysis: Critical thinking skills to classify the problem and identify proper path to solve to get the desired result.
PO 3:Methodology: Designing an optimized procedure to meet the specific result for the particular problem.
PO 4: Innovation: Use innovation-based knowledge and creative methods including design of experiments, data analysis and result validation.
PO 5: Modern tool usage : Identify and apply appropriate characterization techniques, resources, and IT based tools including prediction and modelling to complex activities with an understanding of the limitations.
PO 6 : Communication: Interact effectively with people from different backgrounds as both leaders/mentors and team members with reliability and professionalism.
PO 7: Domain: Acquired ability to function in multidisciplinary fields.
PO 8: Society development: Techniques in designing and teaching in both formal and informal venues with students, practitioners, and society. Development and implementation of society outreach/training programs .
PO 9: Ethics: Appropriate ethical principles and delegate professional ethics and responsibilities. High ethical standards in public policy research, teaching, and service.
PO 10: Life-long Learning: To create collaborative and novel leadership in research to deal with growing challenges locally and globally

Programme Specific Outcomes: Integrated M.Sc & Ph.D (APPLIED CHEMISTRY)

PSO 1: Understand the structural aspect of a molecule based on various theoretical explanations and study the various properties of that molecule using various models.
PSO 2: Comprehend the fundamental and the core concept of different material characterization techniques.
PSO 3: Explore and grasp the various concepts related to the various types of chemical reactions and retrosynthetic analysis and apply those concepts in the synthesis of organic molecules.
PSO 4: Learn about the orientation of an atom or a functional group in space (of a molecule) and their property, based on symmetry and to apply these concepts in understanding the atomic and molecular models by quantum approach.
PSO 5: To appreciate the role of different intermediates in organic chemistry and explore their utilization in the synthesis of important organic molecules.
PSO 6: To apply the spectroscop[ical techniques in the characterization of the organic molecules and learn to derive and develop the molecular structure from the spectroscopic data.
PSO 7: To use the concept of kinetics in predicting the feasibility and the rate of the progress of a chemical reaction.
PSO 8: To assimilate the core knowledge of chromatography techniques and employ them to separate the compounds from a mixture.
PSO 9: Develop the skill to synthesize a complex molecule by using the various organic and inorganic synthetic strategy techniques .
PSO 10: Experience with different types of reaction under various conditions.
PSO 11: Comprehend and learn about proper utilization of reagents in chemistry.
PSO 12: Able to gain confidence about the practical knowledge of chemistry and their application in real life.
PSO 13: Learn about the safety and precaution about various chemicals and reactions.

Course Outcomes: Integrated M.Sc & Ph.D (APPLIED CHEMISTRY)

Inorganic Chemistry- I(CH-6101)
CO1.Classify and recognize the symmetry elements and their operations and required to specify molecular symmetry,
CO2.Able to apply latest concepts of bonding to metal-ligand bonding in transition metal complexes,
CO3.Able to understand spectroscopic term symbol and utilize Orgel as well as Tanable-Sugano diagram to calculate Racah parameters,
CO4.Use the knowledge of magnetic properties of complexes for different applications such as data processing and storage devices.

Inorganic Chemistry-II(CH-6102)
CO1. Able to understand the mechanism of substitution reactions pertaining to transition metal complexes.
CO2. Explain about different types of electron transfer reaction and factor affecting them as well as physiological effect on biological system.
CO3. Understand the structures and functions of different oxygen carrying metallo-proteins and enzymes Able to conceptualize the mechanism of photosynthesis.

Inorganic Chemistry Lab-I(CH6191)
CO1.Analyze the inorganic radicals in a mixture of samples
CO2.Separate metal ions from the mixture based on volumetric and gravimetric methods
CO3.Find the stability constat of complexes

Inorganic Chemistry Lab-II(CH-6192)
CO1.Sythesise different Metal-Ligand coordinate complexes
CO2.Understand and use different characterisation techniques like IR FTIR , UV spectroscopy

Physical Chemistry-I(CH6301)
CO1.Understand the condition of spontaneity and equilibrium and find conducive conditions for different industrial processes
CO2.Understand theories of reaction rate and catalysis, able to write rate law of complex reactions and develop the rate law for different applications
CO3.Evaluate some important physical parameters using electrochemical cells. use electrochemical cell to measure pH, KSP, equilibrium constant etc.
CO4.Will be able to indify and learn the role of electrochemistry and its applications in energy sector
CO5. Apply quantum mechanical model systems to handle the interaction of atoms and molecules with electromagnetic radiations

Physical Chemistry-II(CH6302)
CO1.Apply the knowledge of thermodynamics to decide the feasibility of a given process and derive relations pertaining to reversible process.
CO2.To study the electronic structure and its dynamic in atoms and molecules and utlize in different applications.
CO3.Derive, explain and apply spectroscopic transition rules for electronic transitions in atoms and molecules.
CO4.Derive, explain and apply spectroscopic transition rules for vibrational transitions in diatomic and polyatomic molecules.

Physical Chemistry Lab-I(CH 6391)
CO1.Apply the knowledge of Critical Micelle concentration in different solute-solvent systems.
CO2.Can varify the strength of an electrolyte on the basis of Debye-Huckel Onsagar's Equation.
CO3.The dissociation constant can also be detremined for an electrolyte which will indicate about the nature of the electrolyte.
CO4.The student can know the adsorption technique. "

Physical Chemistry Lab-II(CH 6392)
CO1.Student will able to explore different advanced titration techniques using potentiometry.
CO2.Able to use cyclic voltametry to find diffusion coefficients.
CO3.To explore the thermal stability of different materials using TGA and DTGA
CO4. To explore different separation techniques like Solvent extraction, ion-exchange , chromatography etc.

Analytical Chemistry- I(CH 6401)
CO1.Understand chromatography as an important technique that enables the separation, identification and purification of the components of a mixture for a qualitative and qualitative analysis.
CO2.Understand the general principles and theories of different spectroscopic techniques such as UV-is, FTIR, Raman, AAS and Fluorescence spectroscopy.
CO3.Distinguish the speciality and application of different spectroscopic techniques for different applications.
CO4.Design data collection plans, analyze data appropriately and intecept and draw conclusions from those analysis.

Analytical Chemistry- II(CH 6402)
CO1.Develop expertise relevant to professional practice of chemistry, Understand thermo-gravimetric analysis which reveals important information concerning thermal stability of samples.
CO2.Learn analysis of (polarography, pulse polarography methods, anodic stripping voltammetry) thermal methods (thermogravimetric and differential thermal analysis).
CO3.Understand the fundamental principles and use of radio analytical methods for different resarch applications.

Organic Chemistry -I(CH 6201)
CO1.Understand the type of organic reactions catagorically and they will learn about different reactions with ints applications in various organic molecule synthesis. Different aromatic, non-aromatic and anti aromatic compounds.
CO2.They will able to understand about reactivity of different functional group when interacting with carbon and hetero atom based electrophyle and nucleophile.
CO3. Catagorize different types of reactive intermediates, their property and reactivity.)
CO4. Understand about different geometrical isomer of any organic molecule in three dimension (steriochemistry) their nomenclature and reactions.

Organic Chemistry -II(CH 6202)
CO1.Understand the mechanism of different types of concentrated reactions. They will able to understand about different bond breaking and formation activity of a molecule under photochmical conditions.
CO2.Understand about different oxidizing, reducing and other types of reagent and their reactivity. They will able to design the synthetic strategy based on reagent chemistry.
CO3. Characterize an organic molecule based on its carbon and hydrogen atom through NMR Spectroscopy

Organic Lab-I(CH 6291)
CO1.Gather information about the separation of two phases using chromatographic techniques.
CO2.The indentification of individual componets after getting the extraction phasewsie.

Organic Lab-II(CH 6292)
CO1.Sythesis of different Metal-Ligand coordinate complexes for varioustical pharmaceutical applications.
CO2.Information of IR, FTIR , UV spectroscopy and their use to characterize different coordination complexes.

Inorganic Chemistry -III(CH-6103)
CO1.Conceptualize the structure and functional applications of inorganic polymers and cluster.
CO2.Apply the knowledge of spectroscopic techniques for structural elucidation of complexes.
CO3.Understand the synthesis and application of organometallic compounds.

Organic Chemistry -III(CH-6204)
CO1.Understand different C-C single, double and triple bond formation reactions.
CO2.Synthesize carbocyclic, heterocyclic and optically active compounds.
CO3.Develop a logical approach for the synthesis of organic molecule.
CO4.Apply the knowledge of spectroscopic techniques for structural characterization.

Physical Chemistry -III(CH-6303)
CO1.Understand the mechanism of interaction on the surface of solids
CO2.Understand the thermodynamics of Micellazation
CO3.Applications of superconductivity of nano materials

Biophysical Chemistry(CH-6001)
CO1.Able to undersatnd the different interactions that are important for the formation of structures in biological systems and for how thermodynamic parametrs can be measured.
CO2.Understand for the structure of biological membrane.
CO3.Develop the idea about the forces involved in protein folding, misfolding and their dynamics.
CO4.Apply methods for the determination of functional molecular mass of biological macromolecules.
CO5. Aacount for and apply spectroscopic technique and various other biophysical methids for study of structure and functions in biological systems.

Polymer Chemistry(CH-6003)
CO1.Explain the basic concepts of polymer synthetic techniques.
CO2.Describe the principles and concepts of polymer chemistry.
CO3.Analyze the basic reactions in polymer chemistry.
CO4.Describe the physical properties of different polymers.
CO5. Characterize the polymers using various experimental techniques.

Advanced Electrochemistry(CH- 6005)
CO1.Understand electrochemical applications in photo, material, bio and power sectors,
CO2. Know the electrochemical deterioration of metals, alloys and composites and their prevention aspects.

Paints and Adhesives(CH-6002)
CO1.Understand the formulation of paint based on different pigments and polymers
CO2.Apply their knowledge to formulate different types of ecofriendly paints.
CO3. Extent of adhesion of the different types of paints with the subjects. Know the durability of the paints.

Reaction Strategies in Organic Synthesis(CH-6004)
CO1.Understand the different C-C and C-heteroatom bond formation reaction
CO2.Their application in natural product synthesis,
CO3. Synthesize the carbocyclic and heterocyclic ring systems

Programme Specific Outcomes: Integrated M.Sc& Ph.D (APPLIED PHYSICS)

PSO 1: Apply the basic laws of physics in the areas of classical mechanics, Newtonian gravitation, special relativity, electromagnetism, geometrical and physical optics, quantum mechanics, thermodynamics and statistical mechanics, modern physics, electronics, solid state physics, nuclear and particle physics.
PSO 2: Recognize how observation, experiment and theory work together to continue to expand the frontiers of knowledge of the physical universe.
PSO 3: Use basic laboratory data analysis techniques, including distinguishing statistical and systematic errors, propagating errors, and representing data graphically.
PSO 4: Convert a physical situation to a mathematical formulation, and then analyze it quantitatively. PSO 5: Apply more advanced mathematical tools, including Fourier series and transforms, abstract linear algebra, and functions of a complex variable.
PSO 5: Use classic experimental techniques and modern measurement technology, including analog electronics, computer data acquisition, laboratory test equipment, optics, lasers, and detectors.
PSO 6: Communicate verbally, graphically, and/or in writing the results of theoretical calculations and laboratory experiments in a clear and concise manner.
PSO 7: Learn to appreciate how simplified approaches / formulations and approximations can explain wide ranging physical phenomena
PSO 8: Learn to develop microscopic understanding of macroscopic phenomena
PSO 9: Extend imagination skills or develop abstract thinking in getting a firsthand understanding/explanation of complex physical phenomena
PSO 10: Appreciate the underlying principles of physics experiments and in particular, get an appreciation that practical work can foster both an understanding of the content and also the process of learning.
PSO 11: Exercise the use of physical intuition, including the ability to guess an approximate or conceptual answer to a physics problem and recognize whether or not the result of a calculation makes physical sense.

Course Outcomes: Integrated M.Sc & Ph.D (APPLIED PHYSICS)

Classical Mechanics(PH 6101)
CO1.Understand the preliminary mathematical concepts essential for formulation of laws of mechanics.
CO2.Study the classical behaviour of charged particles.
CO3.Study the basic conservation theorems.
CO4.Study the laws of Physics which are free from the frame of reference chosen.
CO5.Study of Lagrangian and Hamiltonian formulations to solve different problems.
CO6.Understand the concepts of variational principles, canonical transformations, Poison and Lagrange's brackets which are quite helpful in dealing with various problems.
CO7.Understand the fundamental concepts to deal with mathematical formulation to solve many related problems.

Mathematical Physics(PH 6103)
CO1.Understand special mathematical functions, such as Bessel Functions, Neumann Functions, Hankel Functions, Modified and Spherical Bessel Functions.
CO2.Apply special mathematical function appropriately in solving problems in physics.
CO3.Understand Green's functions.
CO4.Use matrices and determinants to solve sets of simultaneous linear equations arising from physical problems.
CO5.Know & understand Tensor Analysis, Tensors in General Coordinates and Jacobians.

Quantum Mechanics-I(PH 6105)
Students will have understanding of
CO1.Importance of quantum mechanics compared to classical mechanics at microscopic level.
CO2.Various tools to calculate Eigen values and total angular momentum of particles.
CO3.Application of approximation methods and perturbation theory.

Electronics for Scientists(PH 6107)
Students will have understanding of
CO1.Characteristics of devices like JFET, FET, MOSFET,DIAC, TRIAC, and Multivibrator.
CO2.OP-AMPs, its different applications.
CO3.Different transmission line and its applications.
CO4. Fundamental designing concepts of different types of Logic Gates, Minimization techniques etc.
CO5. Designing of different types of the Digital circuits, and to give the computational details for Digital Circuits.

Physics Laboratory I : Electronics(PH 6191)
CO1.Generate different types of waveforms (sine, square and triangular) with required frequency/amplitude using a function generator and measure the voltage, frequency and phase of the waveforms using CRO
CO2.Design rectifier, amplifier, oscillator, 555 timer circuits using diodes and transistors
CO3.Use the principle of photo emission in optoelectronic devices such as photodiodes and photovoltaic cells
CO4.Acquire the knowledge of basic logic gates and their applications
CO5.Design simple OP-amp circuits for inverting, non-inverting and summing amplifiers; integrators, differentiators, comparators etc and interpret the results
CO6. Calculate the reflection and transmission co-efficient by a vector network analyzer

Quantum Mechanics II(PH 6202)
Having successfully completed this module, the student shall be able to demonstrate knowledge and understanding of:
CO1.operators and states using Dirac's bra and ket notation
CO2. Concept and theory of Dirac equations and its' applications
CO3. Klein Gordon equation and its' interpretation.
CO4. Understand qubits and some basic ideas in quantum computation

Statistical Mechanics(PH 6204)
CO1.Understand the need to use statistics to describe systems containing huge numbers of particles.
CO2. Understand the statistical foundations of Canonical ensemble , Grand canonical ensemble and equivalence.
CO3. Know & understand the Fundamental Postulate of Equilibrium Statistical Mechanics.
CO4. Know & understand the statistical foundation of thermodynamic (absolute) Temperature.
CO5. Understand & be able to apply the principles of quantum statistical mechanics.
CO6. Understand & be able to apply the Debye's theory of specific heat and Bose Einstein condensation.
CO7. Understand & be able to apply Thermodynamics description of phase transitions.
CO8. Understand & be able to apply Classical Thermodynamics to simple problems.
CO9. Understand Landau Theory and Symmetry breaking field.
CO10. Understand one dimensional random walk and its' applications to Brownian Motion.

Electrodynamics(PH 6206)
After reading this subject students can
CO1.Estimate magnitude, direction of electric field and magnetic field generated due to different types of charge and current distribution.
CO2. Formulate and solve electromagnetic wave equations for different boundary conditions.
CO3. Estimate various parameter like reflectance, transmittance, energy density etc. of the electromagnetic waves.
CO4. Apply the aforementioned concepts to understand, analyze and design different types of waveguides.
CO5. Understand the concept of dipole radiation and their mathematical models.

Condensed Matter Physics(PH 6208)
Understand and apply the knowledge of crystal physics and bonding in solids to analyze structural behavior of solids.
CO1. Analyze thermal and electrical conductivity of solids.
CO2. Design semiconductor materials having desired band gap for better practical applications.
CO3. Understand superconductivity and analyze their properties to formulate new research problems.
CO4. Understand the basics of magnetism and apply the understanding to design materials with preferred magnetic properties.

Physics Laboratory III : Modern Optics(PH 6292)
At the end of the course the student will be able to
CO1.know about the different parts of CRT and able to do measurement by producing deflection in it by variation of magnetic field.
CO2.learn about the production of standing waves in Lecher lines (Using UHF) and using them measure dielectric constant of insulating materials.
CO3. plot the graph between various parameters, measured by the use of multimeter using different color of LEDS

Physics Laboratory IV: CONDENSED MATTER PHYSICS(PH 6294)
CO1. Develop experimental understanding about structure determination in solids
CO2. Develop skills about transport property measurement in solids
CO3. Develop understanding about magnetic property measurement in solids
CO4. Understand experimental approaches to ferroelectric and piezoelectric materials
CO5. Develop skills about transport property measurement in solids

Atomic and Molecular Physics(PH 6301)
CO1: To acquire knowledge of the fundamental physics underpinning quantum mechanics, and explain the origin of the terms in the hydrogen fine structure Hamiltonian and estimate their order of magnitude and their effect on the hydrogen energy structure.
CO2: To understand the spin-orbit interaction and meaning of L-S and J-J coupling, and be able to use appropriate quantum numbers for labeling of energy levels.
CO3: To understand the origin of hyperfine structure, and its effect on fine structure levels, and spectral lines. describe the origin of the terms in Fermi's golden rule. Understand and use selection rules in atomic transitions using term symbol.
CO4: To understand the basics of molecular Rotation and vibration and estimation of spectroscopic constants.

Nuclear and Particle Physics(PH 6303)
CO1 : Explain the origin of the various terms in the semi-empirical mass formula and in the nuclear shell model and perform calculations using these models to derive the observed stable nuclei
CO2 : Explain the different forms of radioactivity and account for their occurrence and account for the fission and fusion processes and the basic properties of the nuclear and fusion reactors
CO3 : Calculate the kinematics of various reactions and decay processes, describe the astrophysical processes leading to nuclear synthesis;
CO4 : Understand conceptually the key aspects of the strong force, including asymptotic freedom and quark confinement, illustrating the ideas with basic calculations of the meson masses and electron-positron annihilation to quarks
CO5 : Understands the key experiments in nuclear and particle physics, develop critical thinking and to uncover "alternative facts" in public discussion.

Computational Methods(PH 6305)
CO1 : Understand the FORTRAN programming.
CO2 : Identify and describe the characteristics of various numerical methods.
CO3 : Formulate and solve computationally the problems in physics.
CO4 : Express basic ideas about the density functional theory.
CO5 : Implication to both the classical as well as quantum mechanical problems and learn about the Density Functional Theory.

Thin Film Technology(PH 6373)
CO1 : Understand the differences and similarities between different vacuum based deposition techniques, CO2 : Evaluate and use models for nucleating and growth of thin films,
CO3 : Asses the relation between deposition technique, film structure, and film properties,
CO4 : Apply the knowledge to typical thin film applications
CO5 : Analyse and select deposition techniques for various applications

Physics Practical: SPECTROSCOPY AND ADVANCED PHYSICS(PH 6391)
CO1. Learn about spectroscopic measurements
CO2. Learn about vibrational spectroscopic measurements
CO3. Learn about life time measurements 4. Develop experimental understanding about ultrafast laser experiments

Plasma Physics(PH 6482)
CO 1 : Develop the concept of plasma and its properties
CO 2 : To understand the plasma kinetic theory to solve the several parametrs of plasma.
CO 3 : Formulate and solve engineering problems of different types of plasma production.
CO 4 : Apply the principles of plasma for daily life application

Programme Specific Outcomes: Integrated M.Sc & Ph.D (MATHEMATICS & DATA SCIENCE)

PSO 1: Understand fundamental properties of real numbers in the field of real analysis and complex numbers in complex plane
PSO 2: Apply differential equations to focus on modelling problems of practical life and its method of solutions.
PSO 3: Understand the concepts of metric spaces, topological spaces, vector spaces and their utility.
PSO 4: Numerical methods provide a way to solve those different type of problems which are almost impossible to solve by analytic method.
PSO 5: The mathematical concept of Probability, Statistics and stochastic process equip students to analysis of stochastic dynamical systems in economics, engineering and other fields.
PSO 6: Develop an ability to analyse large data of real-world problem and implement data analysis strategies based on theoretical principles thus interpret results using data analytics.
PSO 7: Machine learning as a sub field of Artificial Intelligence helps to conceptualize and summarize big data problems.
PSO 8: Students will perform the data structures and develop the algorithm design for real life problems.
PSO 9: develop the skill to build and assess data-based models and execute statistical analyses with professional software.
PSO 10: Students will feel comfortable to search various problems and do research in multidisciplinary fields.

Course Outcomes: Integrated M.Sc & Ph.D (MATHEMATICS & DATA SCIENCE)

Analysis(MA 4501)
CO1: understand Metric Space and its related concepts on Real lines.
CO2: solve convergence of series and understand the concept of functions of several variables.
CO3: comprehend the basic concepts of measure theory.
CO4: can evaluate Lebesgue integration.
CO5: understands the basic concepts related to Banach space Lp spaces.

Algebra(MA 4503)
CO1: learns the basic concepts involving Different types of Groups.
CO2: learns the basic concepts of Ring theory , Galois theory and its related concepts
CO3: learns the concepts related to Linear transformation, orthogonal and Unitary transformation
CO4: gets enlightened with the concepts of Eigen Values and Eigen Vectors.
CO5: gets enlightened with the concepts of Real Inner product spaces, Complex Inner product spaces and Positive Definite Matrices.

Programming and Data Structure(MA 4505)
CO1: learns the basic concepts and syntax of C++,
CO2: learns the concepts of functions,classes and related to Operator Overloading,
CO3: learns about structures, pointers and methods involving polymorphism.
CO4: gets introduced to basic concepts of Data Structures,
CO5: learn about Trees, Searching and Sorting.

Differential Equations(MA 4507)
CO1: learns the basic concepts involving Existence and Uniqueness of solutions of ODEs.
CO2: learns the basic concepts of Bounded and Continuous linear operators.
CO3: gets enlightened with the concepts related to Boundary value problems for ordinary differential equations.
CO4: gets enlightened with the concepts of solution of PDE.
CO5: gets enlightened with Boundary value problems.

Numerical Analysis(MA 4509)
CO1: gets enlightened with the advanced interpolation techniques such as Hermite and Spline Interpolation.
CO2: will be able to solve system of linear and non-linear equations by numerical methods.
CO3: can evaluate definite integrals using numerical methods.
CO4: can solve ordinary differential equations by numerical methods.
CO5: can solve partial differential equations by numerical methods.

Programming and Numerical Analysis Lab with MATLAB(MA 4591)
CO1: Write program in C for some Numerical Methods.
CO2: Use MATLAB for some Numerical Methods
CO3: Develop the skill to write algorithms for different numeric problems
CO4: Know the use of different keywords of C language and MATLAB
CO5: Transfer Algorithm to programming languages
CO6: Know the importance of numerical methods for approximations

Topology(MA 4502)
CO1: Demonstrate an understanding of the concepts of metric spaces and topological spaces, and their role in mathematics.
CO2: Demonstrate familiarity with a range of examples of these structures.
CO3: Prove basic results about completeness, compactness, connectedness and convergence within these structures.
CO4 : Use the Banach fixed point theorem to demonstrate the existence and uniqueness of solutions to differential equations.
CO5: Demonstrate an understanding of the concepts of Hilbert spaces and Banach spaces, and their role in mathematics.

Optimization Technique(MA 4504)
CO1: The abilities to apply knowledge of mathematics and computing to the design and analysis of optimization methods by Line-search and trust-region techniques.
CO2: to analyze a problem and identify the computing requirements appropriate for its solution by Conjugate-gradient, Newton, quasi-Newton and large-scale methods.
CO3: to design and conduct experiments and numerical tests of optimization methods, and to analyze and interpret their results of Derivative-free optimization. Least-squares problems. Nonlinear Mathematical Programming Problem.
CO4: An ability to apply design and development principles in the construction and implementation of software systems of varying complexity to meet desired needs using constrained optimization.

CO5: Students will also be able to solve optimization problems by interior point method.

Numerical Linear Algebra(MA 4506)
CO1: learns the fundamental concepts of matrix algebra.
CO2: able understand the orthogonality of matrix spaces.
CO3: Comprehend the introductory concepts of computer arithmetic.
CO4: Comprehend the introductory concepts of Condition number of a matrix.
CO5: gets an idea about SVD and their applications.

Statistical Inference(MA 4508)
CO1: learns the concepts involving Fundamental of distributions.
CO2: learns the basic concepts of Parametric Point Estimation.
CO3: gets enlightened with the concepts of Testing of Hypotheses.
CO4: learns the concepts related to Bayesian Inference.
CO5: gets enlightened with the concepts of linear, logistic and Poisson Regression.

Discrete Mathematics(MA 4510)
CO1:Use logical connectives and quantifiers to construct and Verify the correctness mathematical arguments.
CO2: Using different proof techniques they solve different kind of problems.
CO3:Using advanced counting principles they can estimate the time require for solving a problem.
CO4: Using discrete mathematical structures they can construct social networks.
CO5:By knowing various algebraic structures they go for coding and form Languages and Grammars.
CO6:Mostly they are able for critical thinking of mathematics directly related to computer science.