Programme Outcomes

1. Students completing this programme will be able to construct and develop logical arguments for mathematical proofs, describe mathematical ideas from multiple perspectives and explain fundamental concepts of mathematics to non-mathematicians.

2. Students will acquire good knowledge to solve problems in advance areas of Mathematics like Analysis, Algebra, Geometry, Differential Equations, Number Theory etc. Thus, this programme will help students in building a solid foundation for further research in mathematics.

3. Students will be able to know the importance of mathematical modelling, simulation and computational methods to solve real world problems.

4. Students will acquire knowledge in related areas like computer science and statistics and develop skills in Programming Languages like C++, Python, SAGE etc. Thus, this programme helps the students to enhance their employability for government jobs, jobs in banking, insurance and investment sectors, data analyst jobs and jobs in various other public and private enterprises.

5. Completion of this programme will enable the students to join research programmes and undertake independent research initiatives.

6. Completion of this programme will enable the students to build a career in teaching.

Programme Outcomes

1. Students completing this programme will be able to construct and develop logical arguments for mathematical proofs, describe mathematical ideas from multiple perspectives and explain fundamental concepts of mathematics to non-mathematicians.

2. Students will acquire good knowledge to solve problems in advance areas of Mathematics like Analysis, Algebra, Geometry, Differential Equations, Number Theory etc. Thus, this programme will help students in building a solid foundation for further research in mathematics.

3. Students will be able to know the importance of mathematical modelling, simulation and computational methods to solve real world problems.

4. Students will acquire knowledge in related areas like computer science and statistics and develop skills in Programming Languages like C++, Python, SAGE etc. Thus, this programme helps the students to enhance their employability for government jobs, jobs in banking, insurance and investment sectors, data analyst jobs and jobs in various other public and private enterprises.

5. Completion of this programme will enable the students to join research programmes and undertake independent research initiatives.

6. Completion of this programme will enable the students to build a career in teaching.

Undergraduate Course (B.Sc.) in Economics under CBCS
Effective from 2018-2019 Session

Programme Outcomes

- Enable students to critically assess socio-economic realities through an application of their theoretical knowledge base in economics
- Provide basic theoretical and software-based knowledge to generate problem solving abilities in applied domains of economics
- Develop job-oriented skills through appropriate combination of ability enhancement and skill enhancement courses
- Offer holistic and multidisciplinary education to broaden academic experience of students and prepare them to undertake socially meaningful multi-disciplinary research

Course Code	Course Name	Course Outcome
ECON01C1	Introductory Microeconomics	CO1: Expose the students to the basic principles of microeconomic theory CO2: Illustrate how microeconomic concepts can be applied to analyse real-life situations CO3: Understand consumer and producer behaviours and issues related to a perfectly competitive market
ECON01C2	Mathematical Methods for Economics-I	CO1: Transmit the mathematical tools to enable study of economic theory CO2: Illustrate method of applying mathematical techniques to economic theory CO3: Develop the ability to translate economic problems into mathematical models and hone the skills to solve the problems through a wide array of mathematical techniques
ECON02C3	Introductory Macroeconomics	CO1: Introduce basic concepts of Macroeconomics CO2: Basic analysis of macro variables CO3: Introduction to software to analyse macro variables
ECON 02C4	Mathematical Methods for Economics-II	CO1: Transmit the mathematical tools to enable study of economic theory CO2: Illustrate method of applying mathematical techniques to economic theory C03: Develop the ability to translate economic problems into mathematical models and hone the skills to solve the problems through a wide array of mathematical techniques
ECON03C5	Intermediate Microeconomics-I	CO1: learn the advanced models of behaviour of an economic individual CO2: to develop understanding of the workings of various market structures and price determination CO3: to be able to analyse efficiency implications of individual choices and compare various possible policy interventions which address inefficiencies
ECON03C6	Intermediate Macroeconomics-I	CO1: Discuss key models of Macroeconomics CO2: Understand limitations of monetary & fiscal policy

Course Code	Course Name	Course Outcome
		CO3: Understand theoretical issues related to an open economy
ECON03C7	Statistical Methods for Economics	CO1: Introduces statistical methods for economics CO2: Discusses sampling techniques used to collect survey data CO3: Bridge between probability theory and statistical inference
ECON03SEC1	Data management and presentation using Microsoft Excel and R	CO1: To learn data management and presentation skills using Excel and R CO2: To understand and apply different statistical functions, logical functions, and codes in Excel and R to compute descriptive statistics and visualize data for univariate and multivariate datasets. CO3: Encourage learning with doing using real world datasets
ECON 04C8	Intermediate Microeconomics-II	CO1: Introduce strategic firm decision-making and basics of game theory CO2: Theoretical principles of welfare Economics CO3: Market failures and solutions
ECON 04C9	Intermediate Macroeconomics-II	CO1: Understand and apply microeconomic theories to analyze macroeconomic phenomena such as consumption, investment and demand for money CO2: Understand Theories of Economic growth and its application CO3: Understand evolution of schools of macroeconomic thought
ECON 04C10	Introductory Econometrics	CO1: Comprehensive introduction to basic econometric concepts and techniques including estimation and hypothesis testing CO2: Diagnostic tests of simple and multiple regression models CO3: Hands on training for understanding the econometric models
ECON 04SEC2	Analyzing contemporary economic issues	CO1: learn data tools to analyse secondary data on aggregate and individual economic activity CO2: learn methods of report writing to present systematically the findings of any data analysis CO3: learn techniques of report presentation for executive dissemination
ECON05C11	Indian Economy-I	CO1: Understand Economic Development since Independence CO2: Understand issues like poverty, inequality, unemployment, population and human development in India CO3: Learn to Compare of trends of India's key macroeconomic and socio-demographic indicators with other countries
ECON05C12	Development Economics-I	CO1: Application of economic theory in modelling situations of economic underdevelopment CO2: Learning new mathematical tools to facilitate economic modelling CO3: Learning data tools to verify economic models

Course Code	Course Name	Course Outcome
ECON05DSE1A (Department Specific Elective)	Applied Econometrics	CO1: Foundation in applied econometric analysis CO2: Develop skills required for empirical research in economics. CO3: Use software for analysing real life data
ECON05DSE1B/2B (Department Specific Elective)	Game Theory and Information Economics	CO1: Introduce the concepts and work with different applications of sequential games CO2: Learn the models with finite and infinite repeated games and Bayesian games CO3: Learning about game theoretic models based on informational asymmetry like Moral Hazard. Adverse Selection with applications
ECON05DSE2C (Department Specific Elective)	Public Economics	CO1: Introduce the idea of public economics to the students and understand various functions of the government CO2: Understand the microeconomic approach to public finance through various models CO3: Learn about taxation. budget and debt
ECON 06C13	Indian Economy II	CO1: Can apply the economic theories to analyse the Indian economic problems CO2: Learn the recent public policies in India and their effectiveness using secondary data CO3: Develop ability to review articles related to Indian economic problems
ECON 06C14	Development Economics II	CO1: Application of economic theory in modelling situations of economic underdevelopment CO2: Learning new mathematical tools to facilitate economic modelling CO3: Learning data tools to verify economic models
ECON 06DSE3A (Department Specific Elective)	International Economics	CO1: Understand basis. composition. direction and consequences of international trade CO2: understand pure theories of trade and trade policy CO3: Understand effect of trade on growth and welfare
ECON 06DSE3B/4B (Department Specific Elective)	Financial Economics	CO1: Understand core principles of corporate finance and capital market. including corporate investment decisions. capital structure and dividend policy CO2: Apply theoretical concepts to practical issues in the derivative markets. including pricing. hedging and risk management CO3: Learning how to handle financial market data to value financial assets and assess the risk associated with them
ECON06DSE4C (Department Specific Elective)	Environmental Economics	CO1: Gain knowledge on how economic theory and policy analysis can be applied to various environmental problems. CO2: Learn analytical concepts concerning environmental externalities and optimal allocation of natural resources. CO3: Learn and apply different valuation techniques in case of non-market inputs and outputs.

GE PAPERS

ECON01GE1:	Introductory Microeconomics	CO1: Introduce students to the basic principles of microeconomic theory

Course Code	Course Name	Course Outcome
		CO2: They get to learn about basic demand - supply mechanisms and the concept of equilibrium CO3: Understand behaviours of households and firms and the issues related to market structures
ECON02GE2	Introductory Macroeconomics	CO1: Introduce basic concepts of Macroeconomics CO2: Basic analysis of macro variables like money. inflation. unemployment CO3: Introduce basic macroeconomic theories of prices and income determination
ECON03GE3A:	Indian Economy I	CO1: Understand Economic Development since Independence CO2: Understand issues like poverty. inequality. unemployment. population and human development in India CO3: Learn to Compare of trends of India's key macroeconomic and socio-demographic indicators with other countries
ECON03GE3B:	Money and Banking	CO1: To understand theory and functioning of the monetary and financial markets of the economy. CO2: To understand the organization. structure and role of financial markets and institutions. CO3: To learn about financial and banking sector reforms and monetary policy with special reference to India
ECON04GE4A:	Indian Economy II	CO1: Can apply the economic theories to analyse the Indian economic problems CO2: Learn the recent public policies in India and their effectiveness using secondary data CO3: Develop ability to review articles related to Indian economic problems
ECON04GE4B	Public Economics	CO1: Introduce the idea of public economics to the students and understand various functions of the government CO2: Understand the microeconomic approach to public finance through various models CO3: Learn about taxation. budget and debt

Undergraduate Course (B.Sc.) in Economics under CBCS
Effective from 2022-2023 Session
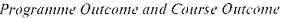
Programme Outcomes

- Enable students to critically assess socio-economic realities through an application of their theoretical knowledge base in economics
- Provide basic theoretical and software-based knowledge to generate problem solving abilities in applied domains of economics
- Develop job-oriented skills through appropriate combination of ability enhancement and skill enhancement courses
- Offer holistic and multidisciplinary education to broaden academic experience of students and prepare them to undertake socially meaningful multi-disciplinary research

Course Code	Course Name	Course Outcome
ECON01C1	Introductory Microeconomics	CO1: Expose the students to the basic principles of microeconomic theory CO2: Illustrate how microeconomic concepts can be applied to analyse real-life situations CO3: Understand consumer and producer behaviours and issues related to a perfectly competitive market
ECON01C2	Mathematical Methods for Economics-I	CO1: Transmit the mathematical tools to enable study of economic theory CO2: Illustrate method of applying mathematical techniques to economic theory CO3: Develop the ability to translate economic problems into mathematical models and hone the skills to solve the problems through a wide array of mathematical techniques
ECON02C3	Introductory Macroeconomics	CO1: Introduce basic concepts of Macroeconomics CO2: Basic analysis of macro variables CO3: Introduction to software to analyse macro variables
ECON02C4	Mathematical Methods for Economics-II	CO1: Transmit the mathematical tools to enable study of economic theory CO2: Illustrate method of applying mathematical techniques to economic theory C03: Develop the ability to translate economic problems into mathematical models and hone the skills to solve the problems through a wide array of mathematical techniques
ECON03C5	Intermediate Microeconomics-I	CO1: learn the advanced models of behaviour of an economic individual CO2: to develop understanding of the workings of various market structures and price determination CO3: to be able to analyse efficiency implications of individual choices and compare various possible policy interventions which address inefficiencies
ECON03C6	Intermediate Macroeconomics-1	CO1: Discuss key models of Macroeconomics CO2: Understand limitations of monetary & fiscal policy CO3: To have knowledge about old and new macroeconomic schools of thoughts
ECON03C7	Statistical Methods for Economics	CO1: Introduces statistical methods for economics CO2: Discusses sampling techniques used to collect survey data CO3: Bridge between probability theory and statistical inference

Course Code	Course Name	Course Outcome
ECON03SEC1 (Skill Enhancement Paper)	Data management and presentation using Microsoft Excel and R	CO1: To learn data management and presentation skills using Excel and R CO2: To understand and apply different statistical functions, logical functions, and codes in Excel and R to compute descriptive statistics and visualize data for univariate and multivariate datasets. CO3: Encourage learning with doing using real world datasets
ECON 04C8	Intermediate Microeconomics-II	CO1: Introduce strategic firm decision-making and basics of game theory CO2: Theoretical principles of welfare Economics CO3: Market failures and solutions
ECON 04C9	Intermediate Macroeconomics-II	CO1: Understand and apply microeconomic theories to analyze macroeconomic phenomena such as consumption, investment and demand for money CO2: Understand Theories of Economic growth and its application CO3: Understand theoretical issues related to an open economy
ECON 04C10	Introductory Econometrics	CO1: Comprehensive introduction to basic econometric concepts and techniques including estimation and hypothesis testing CO2: Diagnostic tests of simple and multiple regression models CO3: Hands on training for understanding the econometric models
ECON 04SEC2	Analyzing contemporary economic issues	CO1: learn data tools to analyse secondary data on aggregate and individual economic activity CO2: learn methods of report writing to present systematically the findings of any data analysis CO3: learn techniques of report presentation for executive dissemination
ECON05C11	Indian Economy-I	CO1: Understand Economic Development since Independence CO2: Understand issues like poverty, inequality, unemployment, population and human development in India CO3: Learn to Compare of trends of India's key macroeconomic and socio-demographic indicators with other countries
ECON05C12	Development Economics-I	CO1: Application of economic theory in modelling situations of economic underdevelopment CO2: Learning new mathematical tools to facilitate economic modelling CO3: Learning data tools to verify economic models
ECON05DSE1A	Applied Econometrics	CO1: Foundation in applied econometric analysis CO2: Develop skills required for empirical research in economics. CO3: Use software for analysing real life data
ECON05DSE1B/2B (Department Specific Elective)	Game Theory and Information Economics	CO1: Introduce the concepts and work with different applications of sequential games CO2: Learn the models with finite and infinite repeated games and Bayesian games

Course Code	Course Name	Course Outcome
		CO3: Learning about game theoretic models based on informational asymmetry like Moral Hazard. Adverse Selection with applications
ECON 06C13	Indian Economy II	CO1: Can apply the economic theories to analyse the Indian economic problems CO2: Learn the recent public policies in India and their effectiveness using secondary data CO3: Develop ability to review articles related to Indian economic problems
ECON 06C14	Development Economics II	CO1: Application of economic theory in modelling situations of economic underdevelopment CO2: Learning new mathematical tools to facilitate economic modelling CO3: Learning data tools to verify economic models
ECON 06DSE3A (Department Specific Elective)	International Economics	CO1: Understand basis. composition. direction and consequences of international trade CO2: understand pure theories of trade and trade policy CO3: Understand effect of trade on growth and welfare
ECON 06DSE3B/4B (Department Specific Elective)	Financial Economics	CO1: Understand core principles of corporate finance and capital market. including corporate investment decisions. capital structure and dividend policy CO2: Apply theoretical concepts to practical issues in the derivative markets. including pricing. hedging and risk management CO3: Learning how to handle financial market data to value financial assets and assess the risk associated with them
ECON06DSE4C (Department Specific Elective)	Environmental Economics	CO1: Gain knowledge on how economic theory and policy analysis can be applied to various environmental problems. CO2: Learn analytical concepts concerning environmental externalities and optimal allocation of natural resources. CO3: Learn and apply different valuation techniques in case of non-market inputs and outputs.
GE PAPERS		
ECON01GE1:	Introductory Microeconomics	CO1: Introduce students to the basic principles of microeconomic theory CO2: They get to learn about basic demand - supply mechanisms and the concept of equilibrium CO3: Understand behaviours of households and firms and the issues related to market structures
ECON02GE2	Introductory Macroeconomics	CO1: Introduce basic concepts of Macroeconomics CO2: Basic analysis of macro variables like money. inflation. unemployment CO3: Introduce basic macroeconomic theories of prices and income determination
ECON03GE3A	Indian Economy 1	CO1: Understand Economic Development since Independence CO2: Understand issues like poverty, inequality. unemployment. population and human development in India CO3: Learn to Compare of trends of India's key macroeconomic and socio-demographic indicators with other countries
ECON03GE3B	Money and Banking	CO1: To understand theory and functioning of the monetary and financial markets of the economy.

Course Code	Course Name	Course Outcome
		CO2: To understand the organization, structure and role of financial markets and institutions. CO3: To learn about financial and banking sector reforms and monetary policy with special reference to India
ECON04GE4A	Indian Economy II	CO1: Can apply the economic theories to analyse the Indian economic problems CO2: Learn the recent public policies in India and their effectiveness using secondary data CO3: Develop ability to review articles related to Indian economic problems
ECON04GE4B	Public Economics	CO1: Introduce the idea of public economics to the students and understand various functions of the government CO2: Understand the microeconomic approach to public finance through various models CO3: Learn about taxation, budget and debt

04 Years Bachelor Programme under CBCS for
B. Sc. Honours with Research in Economics

Effective from 2023-2024 Session

Programme Outcomes

- Develop capacity to apply theoretical knowledge in economics to critically evaluate complex socio-economic realities
- Offer basic training in data management and software skills for undertaking independent research
- Provide students with real-life experience and develop market-oriented skills through education in an environment conducive to industry-academia interaction and internships to improve potential for placement or entrepreneurial activities through start ups
- Impart holistic and multidisciplinary education through an appropriate bouquet of minor, value-added and multi-disciplinary courses to develop a strong ethical sense among students and prepare them to undertake socially meaningful multi-disciplinary research and play a constructive role as a responsible member of society

Course Code	Course Name	Course Outcome
Major Papers		
ECON101C01	Introductory Microeconomics	CO1: Expose the students to the basic principles of microeconomic theory CO2: Illustrate how microeconomic concepts can be applied to analyse real-life situations CO3: Understand consumer and producer behaviours and issues related to a perfectly competitive market
ECON102C02	Mathematical Methods in Economics-1	CO1: Transmit the mathematical tools to enable study of economic theory CO2: Illustrate method of applying mathematical techniques to economic theory CO3: Develop the ability to translate economic problems into mathematical models and hone the skills to solve the problems through a wide array of mathematical techniques
ECON151C03	Introductory Macroeconomics	CO1: Introduce basic concepts of Macroeconomics CO2: Basic analysis of macro variables CO3: Introduction to software to analyse macro variables
ECON152C04	Mathematical Methods in Economics-II	CO1: Transmit the mathematical tools to enable study of economic theory CO2: Illustrate method of applying mathematical techniques to economic theory C03: Develop the ability to translate economic problems into mathematical models and hone the skills to solve the problems through a wide array of mathematical techniques
ECON201C05	Intermediate Microeconomics-I	CO1: to learn the advanced models of behaviour of an economic individual CO2: to develop understanding of the workings of various market structures and price determination CO3: to be able to analyse efficiency implications of individual choices and compare various possible policy interventions which address inefficiencies
ECON202C06	Intermediate Macroeconomics-I	CO1: To have knowledge about old and new macroeconomic schools of thoughts CO2: Understand responses to business cycles CO3: Understand limitations of monetary & fiscal policy

Course Code	Course Name	Course Outcome
Major Papers		
ECON241SEC01	Data Analysis with R	CO1: Analysing data with R programming language CO2: A comprehensive introduction to R packages, data management, and data visualization with R CO3: Application with publicly available real-world data
ECON251C07	Intermediate Microeconomics-II	CO1: Introduce strategic firm decision-making and basics of game theory CO2: Theoretical principles of welfare Economics CO3: Market failures and solutions
ECON252C08	Intermediate Macroeconomics-II	CO1: Understand and apply microeconomic theories to analyze macroeconomic phenomena such as consumption, investment and demand for money CO2: Understand Theories of Economic growth and its application CO3: Understand theoretical issues related to an open economy
ECON291SEC02	Working with Data	CO1: Analysing data using STATA software CO2: Learn basic principles of data management, including data management and descriptive statistics CO3: Learn how to write project reports with publicly available data
ECON341SI01	Summer Internship	
ECON301C09	Statistical Methods for Economics	CO1: Introduces statistical methods for economics CO2: Discusses sampling techniques used to collect survey data CO3: Bridge between probability theory and statistical inference
ECON302C10	Development Economics	CO1: Application of economic theory in modelling situations of economic underdevelopment CO2: Learning new mathematical tools to facilitate economic modelling CO3: Learning data tools to verify economic models
ECON303C11	Indian Economy	CO1: Understand major trends in economic indicators and policy debates in India in the post-Independence period, with particular emphasis on paradigm shifts and turning points. CO2: Understand major policy debates and be able to evaluate the Indian empirical evidence. CO3: To be able to critically assess the public policies and analyse their impact in shaping trends in key economic indicators in India.
ECON351C12	Econometrics I	CO1: Comprehensive introduction to basic econometric concepts and techniques including estimation and hypothesis testing CO2: Diagnostic tests of simple and multiple regression models CO3: Hands on training for understanding the econometric models
ECON352C13	Econometrics II	CO1: Introduces the senior UG students to the modern econometric time series CO2: Introduces the senior UG students to panel data analysis CO3: Using real life data to study empirics and interpretations of econometric models
ECON353C14	International Economics	CO1: Understand basis, composition, direction and consequences of international trade

Course Code	Course Name	Course Outcome
Major Papers		
		CO2: understand pure theories of trade and trade policy CO3: Understand effect of trade on growth and welfare
ECON354C15	Public Economics	CO1: Introduce the idea of public economics to the students and understand various functions of the government CO2: Understand the microeconomic approach to public finance through various models CO3: Learn about taxation, budget and debt
ECON401C16	Econometrics III	CO1: Covers statistical concepts of hypothesis testing, estimation and diagnostic testing of multiple regression models CO2: Introduces qualitative dependent variable models CO3: Using real life data to study empirics and interpretations of econometric models
ECON402C17	Causal Inference and Impact Evaluation	CO1: Understand how to evaluate policy making CO2: Distinguish between association and causation CO3: Conversant with software
ECON403C18	Financial Economics	CO1: Understand core principles of corporate finance and capital market, including corporate investment decisions, capital structure and dividend policy CO2: Apply theoretical concepts to practical issues in the derivative markets, including pricing, hedging and risk management CO3: Learning how to handle financial market data to value financial assets and assess the risk associated with them
ECON441C19	Project/Dissertation	CO1: to be able to perform a comprehensive literature survey on a given theme CO2: to be able to collate and present and statistics from published academic articles and government reports for substantiating and complementing the literature review CO3: to be able to identify a research gap and frame research questions and objectives to answer and address the gap
ECON451C20	Game Theory and Information Economics	CO1: Introduce the concepts and work with different applications of sequential games CO2: Learn the models with finite and infinite repeated games and Bayesian games CO3: Learning about game theoretic models based on informational asymmetry like Moral Hazard, Adverse Selection with applications
ECON452C21	Resource and Environmental Economics	CO1: Gain knowledge on how economic theory and policy analysis can be applied to various environmental problems. CO2: Learn analytical concepts concerning environmental externalities and optimal allocation of natural resources. CO3: Learn and apply different valuation techniques in case of non-market inputs and outputs.
ECON453C22	Economics of Growth	CO1: To learn the various theoretical models of economic growth and their origin CO2: To be able to connect the models to global and country specific economic data CO3: To be able to connect the insights from growth empirics and theories to the larger question of economic development
ECON491C23	Project/Dissertation	CO1: Ability to review academic literature to identify a research gap which should lead to high impact publication

Course Code	Course Name	Course Outcome
Major Papers		
		CO2: Learn new quantitative tools appropriate for framing high quality research questions and answering them systematically CO3: Initiation into designing and managing an academic project
Minor Papers		
ECON104MC01	Introductory Microeconomics	CO1: Introduce students to the basic principles of microeconomic theory CO2: They get to learn about basic demand - supply mechanisms and the concept of equilibrium CO3: Understand behaviours of households and firms and the issues related to market structures
ECON154MC02	Introductory Macroeconomics	CO1: Introduce basic concepts of Macroeconomics CO2: Basic analysis of macro variables like money, inflation, unemployment CO3: Introduce basic macroeconomic theories of prices and income determination
ECON205MC03	Indian Economy I	CO1: Understand Economic Development since Independence CO2: Understand issues like poverty, inequality, unemployment, population and human development in India CO3: Learn to Compare of trends of India's key macroeconomic and socio-demographic indicators with other countries
ECON255MC04	Indian Economy II	CO1: Can apply the economic theories to analyse the Indian economic problems CO2: Learn the recent public policies in India and their effectiveness using secondary data CO3: Develop ability to review articles related to Indian economic problems
ECON492MC06	Research and Publication Ethics	CO1: Understand philosophy and Ethics CO2: Understand scientific conduct and publication ethics CO3: Understand issues relating to open access publishing, understand Databases and Research Metric
ECON442MC05	Research Methodology in Economics	CO1: Understand methodology of Economics CO2: Understand how to plan empirical Research in Economics CO3: Understand Experiments and Quasi-experiments
Multidisciplinary Paper		
ECON141MDC01	Film Appreciation	CO1: Understanding why a film is good CO2: History of film making CO3: Viewing some classic films
ECON191MDC02	Emotional Intelligence and Organizational Excellence	CO1: Understand concepts and applications of emotional intelligence CO2: Understand models of emotional intelligence CO3: Conduct Case studies
ECON192MDC03	Sports Management	CO1: Understanding the relevance of sports in everyday life CO2: Issues behind organisation of a sports event CO3: Basics of sports marketing

Value Added Course

Course Code	Course Name	Course Outcome
Major Papers		
ECON292VAC02	Stock Market for Beginners	CO1: Understand stock market – concepts and issues – efficiency and anomalies CO2: Learn to evaluate firm health and to do technical analysis using financial market data CO3: Learn to construct portfolio using financial data

M. Sc. in Applied Economics (Old Syllabus)

Effective from 2018-2019 Session

Programme Outcome

- Extend theoretical knowledge of the subject and prepare students to evolve from an acquirer of information to the creator of knowledge through applied courses
- Enhance theoretical and software-based knowledge to sharpen problem solving abilities in applied domains of economics like environment, gender, health, education and financial economics
- Enable students to either enter job-market with market-based analytical skills or progress to doctoral research programmes in India and abroad
- Integrate knowledge with the ability to fulfil social and ethical responsibilities to address challenges of inclusive growth and development

Course Code	Course Name	Course Outcome
ECON0701	Advanced Microeconomics I	CO1: to obtain comprehensive knowledge about the extant theorisation of individual economic behaviour CO2: learn mathematical tools like game theory and their applications in the context of economic modeling CO3: develop ability to critically study research articles
ECON0702	Advanced Macroeconomics I	CO1: to obtain comprehensive knowledge about advanced macro models with microeconomic background CO2: to obtain comprehensive knowledge about New Growth Theory CO3: learning comprehensive modelling about real business cycles
ECON0703	Advanced Mathematical Economics	CO1: learn Advanced Set Theory CO2: learn Point Set Topology CO3: learn Measure Theory
ECON0704	Econometric Methods I	CO1: Foundation in applied econometric analysis CO2: Introduction to advanced cross section and time series models CO3: Develop skills required for empirical research in economics.
ECON0791	Applied Econometrics I (Lab Based)	CO1: Use software for analysing real life data CO2: Use of software to analyse advanced cross section and time series models CO3: Knowledge of econometric software
ECON0801	Advanced Microeconomics II	CO1: to obtain comprehensive knowledge about the extant theorisation of individual economic behaviour CO2: learn mathematical tools like game theory and their applications in the context of economic modelling CO3: develop ability to critically study research articles
ECON0802	Advanced Macroeconomics II	CO1: to obtain comprehensive knowledge about advanced macro models with microeconomic background CO2: learn about monetary policy, monetary dynamics, and exchange rate dynamics CO3: learning comprehensive modelling about advanced capitalist system
ECON0803	Issues in Development Economics	CO1: Learn application of economic theory in modelling situations of economic underdevelopment via studying research articles CO2: Learning new mathematical tools for economic modelling

Department of Economics, Presidency University
Programme Outcome and Course Outcome

PRESIDENCY
UNIVERSITY

Course Code	Course Name	Course Outcome
		CO3: Learning statistical techniques to validate economic models
ECON0804	Econometric Methods II	CO1: Introduction to advanced cross-section models CO2: Introduction to univariate time series models CO3: Numerically solve the econometric problems based on theories discussed in this course
ECON0891	Applied Econometrics II (Lab Based)	CO1: Build knowledge of econometric software CO2: Test cross section economic theories using software CO3: Test time series-related economic theories using software
ECON0901	Advanced Econometrics I	CO1: Understand how to evaluate policy making CO2: Distinguish between association and causation CO3: Advanced time series models
ECON0902	Advanced Econometrics II	CO1: Foundations of panel data analysis CO2: Advanced time series models CO3: Basics of exploratory data analysis
ECON0903	Financial Economics I	CO1: Understanding Financial Markets - characteristics and operations of stock. bond and money market CO2: Understanding theories and applications of value. risk and capital budgeting CO3: Understanding theories and applications of capital structure. payout policies and sources of financing
ECON0904	Financial Economics II	CO1: Understanding characteristics and functioning of Foreign Exchange market and Derivative market - pricing and trading CO2: Learning theories and applications of Foreign Exchange Risk Management CO3: Understanding issues relating to Multinational Corporation - Financing. Capital Budgeting and working capital management
ECON0991	Applied Econometrics III	CO1: Software about exploratory analysis CO2: Software about time series CO3: Software of panel data
ECON1091	Quantitative Finance (Lab. Based)	CO1: Learn to use company level data for Financial Statement Analysis CO2: Learn different methods to evaluate financial assets and to construct portfolios CO3: Learning tools of Financial Econometrics to handle financial data
ECON1092	Project	CO1: Ability to review academic literature to identify a research gap which should lead to high impact publication CO2: Learn new quantitative tools appropriate for framing high quality research questions and answering them systematically CO3: Initiation into designing and managing an academic project

M. Sc. in Applied Economics

Effective from 2022-2023 Session

Course Code	Course Name	Course Outcome
ECON0701	Advanced Microeconomics I	CO1: to obtain comprehensive knowledge about the extant theorisation of individual economic behaviour CO2: learn mathematical tools like game theory and their applications in the context of economic modeling CO3: develop ability to critically study research articles
ECON0702	Advanced Macroeconomics I	CO1: to obtain comprehensive knowledge about advanced macro models with microeconomic background CO2: to obtain comprehensive knowledge about New Growth Theory CO3: learning comprehensive modelling about real business cycles
ECON0703	Issues in Development Economics I	CO1: to be able to interpret global economic data and link them to the established theories of economic development CO2: to critically study theoretical economic models and identify their insufficiencies in explain existing disparities in economic development over space and time CO3: to be able to develop research questions based on thorough literature reviews and be able to answer them theoretically or empirically
ECON0704	Econometric Methods I	CO1: Foundation in applied econometric analysis CO2: Introduction to advanced cross section and time series models CO3: Develop skills required for empirical research in economics.
ECON0791	Applied Econometrics I (Lab Based)	CO1: Use software for analysing real life data CO2: Use of software to analyse advanced cross section and time series models CO3: Knowledge of econometric software
ECON0801	Advanced Microeconomics II	CO1: to obtain comprehensive knowledge about the extant theorisation of individual economic behaviour CO2: learn mathematical tools like game theory and their applications in the context of economic modelling CO3: develop ability to critically study research articles
ECON0802	Money, Financial Market and Institutions	CO1: Understanding Monetary Theory and Monetary Policy CO2: Understanding financial market - Stock market, bond market, Money market, and Euro Markets CO3: Understanding organization of foreign exchange market and derivatives with special reference to financial crisis
ECON0803	Advanced Econometrics I	CO1: Introduction to Limited dependent variables CO2: Basics of quantile regression CO3: Introduction to machine learning
ECON0804	Advanced Econometrics II	CO1: Basics of panel data CO2: Advanced models of time series models CO3: Introduction to non-parametric methods
ECON0891	Applied Econometrics I	CO1: Software applications in panel data & time series CO2: Software applications in machine learning using PYTHON CO3: Software applications in non-parametric methods

Course Code	Course Name	Course Outcome
ECON0901	Advanced Econometrics III	CO1: Understand how to evaluate policy making CO2: Distinguish between association and causation CO3: Advanced time series models
ECON0902	Advanced Financial Economics I	CO1: Understanding Financial Markets - characteristics and operations of stock, bond and money market CO2: Understanding theories and applications of value, risk and capital budgeting CO3: Understanding theories and applications of capital structure, payout policies and sources of financing
ECON0903	Advanced Financial Economics II	CO1: Understanding characteristics and functioning of Foreign Exchange market and Derivative market - pricing and trading CO2: Learning theories and applications of Foreign Exchange Risk Management CO3: Understanding issues relating to Multinational Corporation - Financing, Capital Budgeting and working capital management
ECON0991	Applied Econometrics II	CO1: Software to evaluate policy making CO2: Software to distinguish between association and causation CO3: Software to analyse advanced time series models
ECON0992	Project Part I	CO1: to be able to perform a comprehensive literature survey on a given theme CO2: to be able to collate and present and statistics from published academic articles and government reports for substantiating and complementing the literature review CO3: to be able to identify a research gap and frame research questions and objectives to answer and address the gap
ECON1001	Issues in Development Economics II	CO1: Learn market valuation techniques and econometric modelling, understand and integrate climate change and biodiversity conservation into economic frameworks CO2: to obtain comprehensive knowledge about the theory of social network analysis CO3: to obtain comprehensive knowledge about how the presence of economic and social networks shapes the path of economic outcomes with examples
ECON1091	Quantitative Finance (Lab. Based)	CO1: Learn to use company level data for Financial Statement Analysis CO2: Learn different methods to evaluate financial assets and to construct portfolios CO3: Learning tools of Financial Econometrics to handle financial data
ECON1092	Project Part II	CO1: Ability to review academic literature to identify a research gap which should lead to high impact publication CO2: Learn new quantitative tools appropriate for framing high quality research questions and answering them systematically CO3: Initiation into designing and managing an academic project

Presidency University
Department of Physics
Course Outcome (CO)

Every course in the Physics curriculum has been thoughtfully designed so as to familiarize the student with the basics of the subject as well as the recent developments and trends in Physics teaching-learning all over the world. Also the application aspects are emphasized. Students are given hands on training in laboratories, with special emphasis on computer coding, computer interfacing, data analysis and public presentation.

We present here a few samples of the thoughts and course designs crafted for both the undergraduate and the postgraduate classes.

A. Undergraduate Courses

UG 2nd Semester Paper PHYS155MDC02 (Multidisciplinary): Laboratory Data Analysis with Computer Programming
Credits: 3 (Theory). Contact Hours per Week 3

Learning Objectives: To make the students familiar with

1. The use of proper units and resolutions in measurement.

2. The types of error occurring in experiments in practical classes.

3. The essential concepts and methods of data and error analysis

4. The use of computer programming in analysing data and errors.

Scientific Concepts: Drawing and deriving useful information from graphs. Choosing variables and units for plotting graphs. Plotting the data with error bars. Use of semilogarithmic graph. Surface plot. To find the histogram of experimental data. Linear and nonlinear regressions.

Data Analysis and Computer Simulation: Statistical analysis with the given dataset and simulating the results with given formula and parameters for a certain experiment. Several such cases should be exercised.

Interactive Session: Online demonstration of some experiments and simulations. Group discussions. Presentations. Outlining the basics of some classic experiments in physics.

UG 2nd Semester Paper PHYS156MDC03 (Multidisciplinary): Renewable Energy: Sources and Harvesting
Credits: 3 (Theory). Contact Hours per Week 3

Learning Objectives

1. To understand the energy scenario, environmental hazards and the need of renewable energy

2. To comprehend society's present and future energy demands

3. To explore the potential non-conventional energy sources and their utilizations

UG 3rd Semester Paper PHYS203SEC01 (Skill Enhancement): Computer Programming (Statistical Inference)
Credit 4 (Theory). Contact Hours per Week 4

Computer Programming (**Fortran/C/C++**): Basic programming concepts. Constants, variables and arrays. Control Statements. Input/Output facilities. Operators and expressions. Loops. Nested loops. Function. Subroutine, Libraries. Use of random numbers.

Introduction to Software: Basic 2D and 3D graph plotting - plotting functions and data files, fitting data using gnuplot's fit function, polar and parametric plots, modifying the appearance of graphs, Surface and contour plots, exporting plots as eps, pdf, png, jpg files, Introduction to software: XMAXIMA /OCTAVE/ MATLAB/ MATHEMATICA/ Origin Word processing in word and latex.

UG 4th Semester Paper PHYS253SEC02 (Major): Modern Analytical Instruments
Credit 5 (Theory). Contact Hours per Week 5

In this course we focus on the analytical approach in science and technology. The students learn hte importance of sample/data collection, measuring system and calibration, error analysis, and validation for example. Working principles of some specific instruments are introduced. For example,

Colorimeters and Spectrophotometers: UV-Vis-NIR spectrophotometers, Principles of diffraction, monochromator and beam splitting, single and double beam instruments, Sources and detectors. Working principle of Fourier Transform Infrared (FTIR) spectroscopy and its applications. Flame emission photometers.

Gas Analyzers and Pollution Monitoring Instruments: Types of gas analyzers: Oxygen, NO_2 and H_2S types, IR analyzers, thermal conductivity analyzers, analysis based on ionization of gases. Air pollution due to carbon monoxide, hydrocarbons, nitrogen oxides, sulphur dioxide estimation. Dust and smoke measurements.

Chemical and Electrochemical Analysis: Principle of pH measurement, types of glass electrodes, hydrogen electrodes, reference electrodes, selective ion electrodes, ammonia electrodes, biosensors, dissolved oxygen analyzer – Sodium analyzer – Silicon analyzer. Liquid and gas chromatography.

Magnetic Resonance Techniques: Nuclear Magnetic Resonance (NMR) – Basic principles and instrumentation, NMR spectrometer – Applications, particularly in medical science.

X-Ray Diffraction and X-Ray Fluorescence Spectroscopy: Theory and method of X-Ray Diffraction, analysis of the structure of materials. Determination of the size of the particles. X-ray fluorescence as an atomic spectral property, qualitative and quantitative information on the elemental composition of all types of samples. Instrumentation and technique.

Atomic and Molecular Spectroscopy: Fluorescence, Phosphorescence, Luminescence. Vibration spectroscopy, Raman Spectroscopy- a non-destructive chemical analysis tool that offers quantitative knowledge on chemical structure.

Optical and Electron Microscopy: Basics of digital imaging. Optical imaging microscope. Scanning Electron Microscopy (SEM), imaging technique, study of surface micrograph and microstructure analysis. EDAX analysis for the determination of chemical composition of materials. Field Emission Scanning Electron Microscopy (FESEM). Transmission Electron Microscope (TEM): dark and bright field imaging. How to analyse lattice fringes with High resolution transmission electron microscopy (HRTEM). Scanning tunneling microscopy (STM).

A very important part of this course is the interactive conversation with students of different majors, interdisciplinary applications. Seminars and group discussions are encouraged.

UG 4ᵗʰ Semester Paper PHYS255MC04 (Minor): Radiological Physics
Credits: 6 (Theory 5, Tutorial 1). Contact Hours per Week 6

As an essential part of the Physics curriculum we have introduced in the undergraduate 4-year course the very important area of Radiological Physics. The sub-topics include:

Radiation Physics: The very basics of radioactivity, Neutron production, detection; Radionuclide hazards; Internal exposure – contamination control; External exposure – shielding, distance, time; safe handling of radioactive sources; Filters and its use in the image processing; 3 D construction, Fusion imaging principal of DICOM, image transfer PACK technology.

Radionuclide production and Application: **A knowledge of** Medical cyclotron; Use of radionuclide generators; Radionuclide used in therapy. Trace element analysis and a thorough introduction to the nuclear detectors. The principles involved in radiation therapy are taught with care.

Radiation effect and measurements: Biological effects of Radiation; Radiation measurement – monitoring; Personal monitoring: TLD's film; Contamination monitoring; Survey instruments, wipe tests are taught so as to make a student aware of this important area.

Radiation safety and protection: A complete knowledge about the safety aspects is provided to the students of this course. The general method of teaching, like all other subjects, includes group discussion and presentations.

UG 5ᵗʰ Semester Paper PHYS301C09 (Major): Digital Systems and Applications
Credits: 6 (Theory 4, Practical 2). Theory Contact Hours per Week 4

Student attending this course are trained in the details of Digital Principles, Boolean Algebra Combinational Logic Circuits, including data processing circuits. They are introduced to the very important science of Sequential Logic Circuits, that include the basics of computer architecture and programming. In this latter part they learn about microprocessors, data storage systems, program control etc.

In addition we have introduced several sessions, entitled **Seminar/ Interactive Pedagogies where for example, they learn about** Karnaugh map, and of the equivalence of SOP and POS forms among other topics. A training of scientific and analytical reasoning is given and the students learn to think critically about the topics, the multi-disciplinary and interdisciplinary applications of digital systems.

The final (4ᵗʰ) year offers the scope for research and supervised project to the students with the following papers.

UG 7ᵗʰ Semester Paper PHYS442C19 (Project/Dissertation)
UG 7ᵗʰ Semester Paper PHYS405MC05 (Research Methodology)

UG 8ᵗʰ Semester Paper PHYS492C23 (Project/ Dissertation) continuation from 7ᵗʰ semester

UG 8ᵗʰ Semester Paper PHYS493MC06 (Research and Publication Ethics)

B. Postgraduate Courses

The postgraduate Physics curriculum has been updated in July 2022 and we are continuing with that. A major initiative taken in desiging the course has been to make a student familiar with the frontline research fields. The course inspires a student to take up Physics as career, and is also useful for those who eye an applied area, especially jobs related to computer simulation and data analysis. A few points

in this curriculum that deserve attention and appreciation may be cited as examples (while the others remain equally important) are,

1. A strong base in Mathematics is developed through the **PHYS0701: Mathematical Methods** course, spanning 50 Lectures. The important topics such as Vector space, Complex analysis, Differential equations or Integral transforms are taught in details.

2. The courses on Classical, Statistical and Quantum mechanics extend the knowledge acquired in the undergraduate classes and help the students understand the latest development on these subjects.

3. In the laboratory, the start-up experiments (PHYS0791) such as the evaluation of the Lande 'g' factor of DPPH using electron spin resonance spectrometer, a study of the performance of high pass and low pass filters, handling Michelson's Interferometer or studying the characteristics of optical fibre give the students hands-on experimental experience. Special emphasis is given in a separate paper, where the students work in laboratries to learn the science of Data Analysis and Statistical Techniques, learn to estimate the uncertainties in measurements, the chi-square test. The least square fit, plotting of data and preliminary analyses.

4. Another carefully designed course is **PHYS0891: PG Laboratory-III** (Computational Techniques) FORTRAN (or C or C++ or Python) Language. It is a 10-lecture course where a student learns how to write efficient computer programs and solve problems in Physics. Techniques that are needed in Physics research, such as the Interpolation method, solving differential equations or the very important Monte-Carlo scheme are taught and At the end of the course, our experience is that, in general a student becomes quite competent in developing an algorithm, and running the program successfully.

5. Two Special Papers , namely, Nuclear and Particle Physics, and Condensed Matter Physics are offered during the two-year M.Sc. course. Each subject is taught for two consecutive semesters (III and IV). The courses cover a wide range of topics, from the fundamentals to some of the latest developments in the fields.

6. **Project work:** A big strength of the postgraduate curriculum is the option given to the students to do a project work under the supervision of a chosen faculty member. This is a 8-credit prject work, spanning two semesters (III and IV) and the students work on a research-level problem. We have witnessed a series of original research papers published in frontline research journals in the past years, and the trend is continuing. The papers are the result of the extensive project work. Needless to say, that the rigorous teaching in the postgraduate course help a student to move forward and handle a problem of current research interest.

Department of Physics

Presidency University

B.Sc. Programme Outcome

The primary objective of the undergraduate major programme offered by the Department of Physics, at Presidency University is to adequately prepare the students for post-graduate studies (and beyond) in physics and related areas at national and international institutions. This program objective is realised in the new NEP curriculum by not only offering traditional physics courses, but also courses in recently emerging inter-disciplinary areas such as Quantum optics, Quantum computation and Quantum information. Also courses in application areas such as, Physics of electronic devices, Radiological physics, have been designed.

Analytical, experimental and computational skills acquired by the students in this programme, together with a holistic approach to teaching and learning ensures that they are able to contribute meaningfully in a modern complex society. This is reflected in the fact that, apart from traditional academic careers, graduates of this programme in the recent past have successfully embarked on careers in diverse non-traditional areas such as Air traffic controller, scientist at state forensic laboratory, civil services and other administrative government jobs, Police services, manager at multinational corporations etc.

A. Chakrabarti

Professor and Head
Department of Physics
Presidency University, Kolkata

Programme Outcomes (PO) for B.Sc. (Hons) Life Sciences

The programme is designed to achieve the following outcomes:

PO-1: To develop an in-depth knowledge and understanding of the discipline.

PO-2: To encourage students to effectively communicate scientific reasoning and data analysis in both written and oral forms.

PO-3: Create an awareness of the impact of biology on the environment, society, and development outside the scientific community.

PO-4: Inculcate the scientific temperament in the students for careers within and outside the scientific community.

PO-5: Be able to impart knowledge and expertise related to the field.

Programme Outcomes (PO) for M.Sc. (Hons) Life Sciences

PO-1. Develop an understanding of major concepts in Life Sciences.

PO-2. Learning to think analytically, independently and draw a logical conclusion.

PO-3. Create an awareness of the impact of Biology on the environment, society, and development outside the scientific community.

PO-4. To inculcate the scientific temperament in the students for careers within and outside the scientific community.

PO for undergraduate program in B.Sc. Geology

We introduce different components of the earth system sciences to the beginners in Geological sciences to understand the processes active in the geological past and present.
The student is enabled to master theoretical and practical knowledge about geological materials
With the aid of interdisciplinary subjects of basic sciences, the student is encouraged to link the earth based processes to the fundamental laws of basic sciences
A holistic approach towards professional development as a geologist is encouraged where the student applies the knowledge gained in different facets of geological sciences while exploring a geological terrain
Extensive hands on training in fieldwork is imparted (on lithological and structural mapping, paleontology, economic geology, sedimentology, hydrogeology) enabling the students to develop skills to work independently in their professional career.

PO for M.Sc. Course in applied Geology

To gather knowledge and master hands-on exercises in different disciplines of applied geology
To enhance scientific skills and promote research and development activities
To facilitate the student with data management skills for handling large data base and relevant softwares used in the industry
To prepare the students for their employment in Industry, Scientific organizations and service sectors
To produce effective manpower, who will understand and offer solutions to societal issues related to Geology (water, fuel, medical geology, mineral exploration, climate and atmosphere etc)
To develop skills by executing projects independently so that they can be prepared for a professional life as a geologist

Programme Outcome:

Programme Name	Programme outcome
BSC Geography (major)	*PO1: Academic Expertise* i) Exhibit knowledge of the discipline. ii) Explain seminal works in the subject. iii) Develop areas of interest in chosen branches of the discipline. iv) Apply theoretical notions into practice.
	PO2: Critical Thinking i) Recognise the processes underlying the different geographical phenomena. ii) Identify the implications of various social processes in a spatial context.
	PO3: Environment and Sustainability i) Demonstrate awareness of local, regional and global environment. ii) Take informed actions according to socio-cultural contexts and environmental needs.
	PO4: Quantitative Skills i) Understand and apply fundamental principles and method in key areas of the science. ii) Develop problem solving, analytical and logical skills. iii) Understand the importance of technology for development of social studies in synergy with nature.
	PO5: Self-directed and lifelong learning i) Work on career advancement and adapt to changing professional and societal needs.

Department of Chemistry

Presidency University, Kolkata

86/1 College Street, Kolkata 700073

OUTCOME BASED EDUCATION (OBE)

Mapping between Mission and Programme Outcomes (POs)

Mapping between Programme Specific Outcomes (PSOs) and Course Outcomes (COs) for B.Sc. Syllabi

(i) **04 Years** Bachelor Programme under CHOICE BASED CREDIT SYSTME for B. Sc. Honours with Research in Chemistry

(ii) **03 Years** Bachelor Programme under CHOICE BASED CREDIT SYSTME for B. Sc. Honours in Chemistry

Mapping between Programme Specific Outcomes (PSOs) and Course Outcomes (COs) for M.Sc. Syllabus

Mapping between Mission and Programme Outcomes (POs)

Mission:

1. To develop scientific attitude for addressing various socio-economic problems
2. To provide skill based and value added education for generating human resource
3. To translate the scientific knowledge towards revenue generation
4. To promote multi/inter disciplinary curriculum through choice based learning
5. To inspire the students for innovative, fundamental and application oriented research
6. To collaborate with renowned scientific institutes across the world, such as IITs, IISERs, SNBNCBS, RIKEN, Tangji University for conducting research in frontier areas of chemical sciences

Programme Outcomes (POs):

1. Create an amicable learning environment among students to inculcate the deep interests and knowledge in subject.
2. Provide choice-based learning to students.
3. Help students to develop the ability to use their knowledge and skills to interpret and handle the problem arises day to day.
4. Motivate students to pursue advanced studies on their subject of interest.
5. Educate and enhancing student generic skills through skill enhancement courses and value added courses, this may help them creating employment and business opportunities in academia and industries.

Mapping between Mission and B.Sc. Programme Outcomes (PO)

PO Statements	M1	M2	M3	M4	M5	M6
PO1	2	2	1	1	3	1
PO2	1	1	1	3	1	1
PO3	3	3	3	2	3	1
PO4	1	2	1	1	3	1
PO5	3	1	3	2	2	3

1: Slight (Low);   2: Moderate (Medium);   3: Substantial (High)

A graduating student of B.Sc. Chemistry degree expected to:

1. Have proficient theoretical and experimental knowledge in the broad subject area of chemistry as well as different sub-fields of chemistry such as Analytical Chemistry, Inorganic Chemistry, Organic Chemistry, Physical Chemistry, Material Chemistry, etc.

2. Explain, integrate and apply the acquired knowledge to problems that are emerging from the interdisciplinary areas.

3. Be aware of current developments at the forefront in Chemistry and allied subjects.

4. Have hands-on training on various analytical techniques, classical qualitative and quantitative chemical analysis, which enables their job opportunity on chemical industries and various nationalized analytical labs.

5. Have knowledge on hazardous chemical, safe handling of chemicals and role of chemistry on environmental issues.

6. Carry out experiments independently as well as be able to work productively in groups.

7. Construct a research problem as per the social requirement.

8. Communicate the scientific work in oral, written and e-formats as per the requirements.

CHEM241SEC01.1: IT SKILLS FOR CHEMISTS

Course Outcomes (COs):

1. Formulate a set of calculations that can address a relevant research question.

2. Use one or several computer programs and extract useful information.

3. Write a research paper that describes methods, results, and interpretation.

4. Assess the meaning and validity of calculations that appear in the chemical literature

Mapping between PSO and CO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSC7	PSO8
CO1	√	√	√	√	-	-	√	-
CO2	√	√	√	√	-	-	-	-
CO3	√	√	√	√	-	-	√	√
CO4	√	√	√	√	-	-	-	√

CHEM241SEC01.2: Quality Control Analysis of Commercial Products

Course Outcomes (COs):

1. Upon completion of the course, the students should be able to analyse all the day-to-day commercial samples qualitatively, and quantitatively using traditional and advanced techniques.

Mapping between PSO and CO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSC7	PSO8
CO1	√	√	√	√	√	√	√	-

CHEM291SEC02.1: Pharmaceutical Chemistry & Chemistry of Non-Covalent Compounds

Course Outcomes (COs):

1. Design and develop synthetic routes to access various organic compounds with analgesics, antipyretic, anti-inflammatory, antibiotic, antibacterial, antifungal, antiviral and other significant pharmacological activities.
2. Explain aerobic and anaerobic fermentation and their roles in the production of ethanol and citric acid.
3. Conduct synthesis and reactions of important antibiotics such as, Penicillin, Cephalosporin, Chloromycetin and Streptomycin.
4. Describe the pharmaceutical activities of Lysine, Glutamic acid, Vitamin B2, Vitamin B12 and Vitamin C.
5. Synthesize simple and small drug molecules.
6. Understand many biological processes that rely structurally and functionally on the chemistry of non-covalent interactions.

Mapping between PSO and CO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSC7	PSO8
CO1	√	√	√	-	√	-	√	-
CO2	√	√	√	-	√	-	-	-
CO3	√	√	√	√	√	√	√	-
CO4	√	√	√	-	-	-	-	-
CO5	√	√	√	√	√	√	√	-
CO6	√	√	√	-	-	-	-	-

CHEM291SEC02.2: Green Methods in Chemistry

Course Outcomes (COs):

1. Design and develop green synthetic protocol using alternative greener energy sources to minimize the environmental impact of chemical reactions for sustainable development.
2. Get hands on experience of extraction and characterization of natural products and their synthesis.

Mapping between PSO and CO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSC7	PSO8
CO1	√	√	√	-	√	-	√	-
CO2	√	√	√	√	√	√	-	-

CHEM292VAC02: INDUSTRIAL CHEMISTRY

Course Outcomes (COs):

1. On completion of the course, the students will be familiar with chemistry of several commercial products and forensic science.

Mapping between PSO and CO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSC7	PSO8
CO1	√	√	√	-	-	-	√	-

CHEM341SI01: Summer Internship

Course Outcomes (COs):

1. Explore new areas of research in both chemistry and allied fields of science and technology.

2. Mapping between PSO and CO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSC7	PSO8
CO1	√	√	√	√	√	√	√	√

CHEM401C16: Advanced Spectroscopy

Course Outcomes (COs):

1. Analyse the possible photophysical processes for electronically excited molecules
2. Explain the mode of interaction between fluorophores and quenchers which may be useful to develop the idea of optical sensing.
3. Explain theory and instrumentation of magnetic spectroscopy and its application for chemical analysis.
4. Analyse Mössbauer spectra for bioinorganic systems containing Fe in their variable oxidation states.
5. Analyse the EPR spectra of systems having unpaired electrons.

Mapping between PSO and CO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSC7	PSO8
CO1	√	√	√	-	-	-	-	-
CO2	√	√	√	-	-	-	-	-
CO3	√	√	√	-	-	-	-	-
CO4	√	√	√	-	-	-	-	-
CO5	√	√	√	-	-	-	-	-

CHEM441C19: Project Dissertation

Course Outcomes (COs):

1. Explore new areas of research in both chemistry and allied fields of science and technology
2. Perform literature survey for the research topic of his/her area of expertise.
3. Rationalize the research gap for innovation.
4. Comprehend expertise for writing the research reports.
5. Expose safe laboratory practices by handling high end equipment and chemical reagents.

Mapping between PSO and CO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSC7	PSO8
CO1	√	√	√	√	√	√	√	√
CO2	√	√	√	-	-	-	√	√
CO3	√	√	√	-	√	√	√	√
CO4	-	-	-	-	-	-	-	√
CO5	-	-	-	-	√	-	-	-

CHEM442MC05: Research Methodology

Course Outcomes (COs):

1. Select and approach the research problems
2. Perform literature survey on particular research topic
3. Write the abstract, literature survey outcomes etc.
4. Follow basic lab safety protocols and handling of hazardous chemicals, first aid
5. Analyse the spectroscopy and spectrometry data
6. Follow ethics in research, copyright and citation

Mapping between PSO and CO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSC7	PSO8
CO1	√	√	√	-	-	-	√	-
CO2	√	√	√	-	-	-	√	√
CO3	-	-	-	-	-	-	-	√
CO4	-	-	-	-	√	-	-	-
CO5	√	√	√	-	-	-	-	-
CO6	-	-	-	-	-	-	-	√

CHEM451C20: Soft Materials Nanomaterials and Advanced Functional Materials

Course Outcomes (COs):

1. Explain the isotherms empirically as well as molecular basis, chemistry of surfactants, and surface excess.
2. Derive various molecular weight of polymers, explain polydispersity and crystallinity in polymer system.
3. Describe the origin properties of colloidal sol, stability of particles.
4. Classify colloidal particle according to dimensions and applications.
5. Identify the appropriate materials of batteries and supercapacitors for targeted applications.
6. Get specific idea about synthesis functional materials and basics of characterization techniques.

Mapping between PSO and CO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSC7	PSO8
CO1	√	√	√	-	-	-	-	-
CO2	√	√	√	-	-	-	-	-
CO3	√	√	√	-	-	-	-	-
CO4	√	√	√	-	-	-	-	-
CO5	√	√	√	-	-	-	-	-
CO6	√	√	√	-	-	-	-	-

CHEM491C23: Project Dissertation

Course Outcomes (COs):

1. Explore new areas of research in both chemistry and allied fields of science and technology

2. Perform literature survey for the research topic of his/her area of expertise.

3. Rationalize the research gap for innovation.

4. Comprehend expertise for writing the research reports.

5. Expose safe laboratory practices by handling high end equipment and chemical reagents.

Mapping between PSO and CO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSC7	PSO8
CO1	√	√	√	√	√	√	√	√
CO2	√	√	√	-	-	-	√	√
CO3	√	√	√	-	√	√	√	√
CO4	-	-	-	-	-	-	-	√
CO5	-	-	-	-	√	-	-	--

CHEM492MC06: Research and Publication Ethics

Course Outcomes (COs):

1. Conduct the research in a scientific and ethical manner

2. Describe and use the different indexing, citation databases and research metrics.

Mapping between PSO and CO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSC7	PSO8
CO1	-	-	-	-	-	-	-	√
CO2	-	-		-	--	-	-	√

Programme Specific Outcomes (PSOs)

for

03 Years Bachelor Programme under CHOICE BASED CREDIT SYSTME fc

in Chemistry

A graduating student of B.Sc. Chemistry degree expected to:

9. Have proficient theoretical and experimental knowledge in the broad subject area of chemistry as well as different sub-fields of chemistry such as Analytical Chemistry, Inorganic Chemistry, Organic Chemistry, Physical Chemistry, Material Chemistry, etc.

10. Explain, integrate and apply the acquired knowledge to problems that are emerging from the interdisciplinary areas.

11. Be aware of current developments at the forefront in Chemistry and allied subjects.

12. Have hands-on training on various analytical techniques, classical qualitative and quantitative chemical analysis, which enables their job opportunity on chemical industries and various nationalized analytical labs.

13. Have knowledge on hazardous chemical, safe handling of chemicals and role of chemistry on environmental issues.

14. Carry out experiments independently as well as be able to work productively in groups.

15. Construct a research problem as per the social requirement.

16. Communicate the scientific work in oral, written and e-formats as per the requirements.

CHEM03SEC1.1: IT SKILLS FOR CHEMISTS

Course Outcomes (COs):

1. Formulate a set of calculations that can address a relevant research question.

2. Use one or several computer programs and extract useful information.

3. Write a research paper that describes methods, results, and interpretation.

4. Assess the meaning and validity of calculations that appear in the chemical literature.

Mapping between PSO and CO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSC7	PSO8
CO1	√	√	-	-	-	-	√	√
CO2	√	√	-	-	-	√	-	-
CO3	√	√	√	-	-	-	√	√
CO4	√	-	√	-	-	-	-	-

CHEM04SEC2.2: PHARMACEUTICAL CHEMISTRY

Course Outcomes (COs):

1. Design and develop synthetic routes to access various organic compounds with analgesics, antipyretic, anti-inflammatory, antibiotic, antibacterial, antifungal, antiviral and other significant pharmacological activities.

2. Explain aerobic and anaerobic fermentation and their role in the production of ethanol and citric acid.

3. Conduct preparation and reactions of important antibiotics such as, Penicillin, Cephalosporin, Chloromycetin and Streptomycin.

4. Describe the pharmaceutical activities of Lysine, Glutamic acid, Vitamin B2, Vitamin B12 and Vitamin C.

5. Synthesize simple and small drug molecules.

Mapping between PSO and CO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSC7	PSO8
CO1	√	√	-	-	√	-	√	-
CO2	√	-	√	-	-	-	-	-
CO3	√	√	-	√	√	√	√	-
CO4	√	-	-	-	-	-	-	-
CO5	√	√	-	√	√	√	√	-

CHEM05DSE1: POLYMER CHEMISTRY

Course Outcomes (COs):

1. Realize the history of polymeric materials

2. Study experimentally the kinetics of polymerization.

3. Calculate the degree of crystallinity

4. . Determine the molecular weights of polymer by different methods.

5. Apply Flory-Huggins theory to polymer solutions.

6. Prepare and characterize some selected polymers.

Mapping between PSO and CO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSC7	PSO8
CO1	√	-	√	-	√	-	-	-
CO2	√	√	-	√	√	√	-	-
CO3	√	-	-	√	-	-	-	-
CO4	√	√	-	√	-	√	-	-
CO5	√	-	-	-	-	-	-	-
CO6	√	-	-	√	√	√	-	-

CHEM05DSE2: ANALYTICAL METHODS IN CHEMISTRY

Course Outcomes (COs):

1. Handle, plot and analyse the data for absorption and emission spectroscopy.

2. Find complexation ratio of metal and ligand using Job's method

3. Use of AAS and AES for analysis of various water contaminant

4. Interpret the TGA and DSC data and identify the thermal stability and morphological changes of materials

5. Interpret data from modern electrochemical method such as LSV, CV and Coulometry

6. Apply separation techniques such as solvent extraction and chromatography.

Mapping between PSO and CO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSC7	PSO8
CO1	√	√	-	√	-	√	√	-
CO2	√	-	-	√	-	√	-	-
CO3	√	√	√	√	√	√	√	-
CO4	-	√	-	√	-	√	-	-
CO5	√	√	-	√	-	√	√	-
CO6	√	√	-	√	√	√	-	-

CHEM06DSE03: Seminar / Review / Grand Viva

Course Outcomes (COs):

1. Present scientific topics in an organized manner

2. Face the job interviews in a confident manner.

Mapping between PSO and CO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSC7	PSO8
CO1	-	-	√	-	-	-	√	√
CO2	-	-	√	-	-	-	√	√

CHEM06DSE04: BIOLOGICALLY RELEVANT MOLECULES, ORGANIC PHOTOCHEMISTRY, DYES AND SYNTHETIC POLYMERS

Course Outcomes (COs):

1. Explain the functioning of lipid, enzymes in biosystems

2. Demonstrate various kinds of polymers and their uses in modern life

3. Explain the chemistry of dyes in daily life

4. Analyse oils and fats, detections of saponification value, acid value, iodine value etc. which are essential for jobs in oil industries

Mapping between PSO and CO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSC7	PSO8
CO1	√	√	-	-	√	-	-	-
CO2	√	√	-	-	√	-	-	-
CO3	√	√	-	-	√	-	-	-
CO4	-	-	-	√	√	√	√	-

Programme Specific Outcomes (PSOs)

for

Postgraduate Programme (M.Sc.) in Chemistry

A graduating student of M.Sc. Chemistry degree expected to:

17. Have proficient theoretical and experimental knowledge in the broad subject area of chemistry as well as different sub-fields of chemistry such as Analytical Chemistry, Inorganic Chemistry, Organic Chemistry, Physical Chemistry, Material Chemistry, etc.

18. Explain, integrate and apply the acquired knowledge to problems that are emerging from the interdisciplinary areas.

19. Be aware of current developments at the forefront in Chemistry and allied subjects.

20. Have hands-on training on various analytical techniques, classical qualitative and quantitative chemical analysis, which enables their job opportunity on chemical industries and various nationalized analytical labs.

21. Have knowledge on hazardous chemical, safe handling of chemicals and role of chemistry on environmental issues.

22. Carry out experiments independently as well as be able to work productively in groups.

23. Construct a research problem as per the social requirement.

24. Communicate the scientific work in oral, written and e- formats as per the requirements.

Course CHEM 0892: Computer Application

Course Outcomes (COs):

1. Write computer programs to solve linear systems using Gaussian elimination, interpolation, numerical integration and numerical solution of differential equations.

2. Perform Fourier transformations and its applications in spectroscopy.

3. Use quantum chemical programs to do molecular geometry optimization and frequency calculation on chemically relevant systems.

4. Perform classical Molecular Dynamics (MD) simulation on biologically relevant systems.

Mapping between PSO and CO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	√	√	√	-	-	√	√	√
CO2	√	√	√	-	-	√	√	√
CO3	√	√	√	-	-	√	√	√
CO4	√	√	√	-	-	√	√	√

Course CHEM 0992: Research Based Lab

Course Outcomes (COs):

1. Explore current research problems
2. Prepare themselves to handle research projects

Mapping between PSO and CO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	√	√	√	√	√	√	√	√
CO2	√	√	√	√	√	√	√	√

Course CHEM 0901: Symmetry, Macromolecules and Magnetic Resonance
Course Outcomes (COs):

1. Elucidate point group of various geometry, construct matrix representation for point groups, character table and apply the concept to spectroscopy, crystal field theory.

2. Derive the rate expression for polymerization process, ΔS, ΔG, relative vapor pressure and explain the properties of colloidal solution, concepts of nanoscience.

3. Explain theory and instrumentation of magnetic spectroscopy and its application for chemical analysis.

Mapping between PSO and CO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	√	√	√	-	-	-	-	-
CO2	√	√	-	-	-	-	-	-
CO3	√	√	√	-	-	√	-	-

Course CHEM 0902: Spectroscopy, Supramolecules and Nanomaterials
Course Outcomes (COs):

1. Analyze the spectroscopic data, as applicable to organic, inorganic and biological systems.

2. Analyze the possible photophysical processes for electronically excited molecules

3. Explain selection rule and their relaxation for electronic transition

4. Explore the use of supramolecular material chemistry in modern chemical society

Mapping between PSO and CO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	√	√	-	-	-	√	-	-
CO2	√	√	-	-	-	√	-	-
CO3	√	√	-	-	-	√	-	-
CO4	√	√	√	-	-	√	-	-

Course CHEM 1091 & CHEM 1092: Project dissertation, presentation, defence and proposal

Course Outcomes (COs):

1. Explore new areas of research in both chemistry and allied fields of science and technology

2. Perform literature survey for the research topic of his/her area of expertise.

3. Rationalize the research gap for new innovation.

4. Comprehend expertise for writing the research reports.

5. Expose safe laboratory practices by handling high end equipment and chemical reagents.

Mapping between PSO and CO

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	√	√	√	√	√	√	√	√
CO2	√	√	√	-	√	-	√	√
CO3	√	√	√	-	√	√	√	-
CO4	√	√	√	-	√	-	-	√
CO5	√	√	√	√	√	√	-	-

Program Outcome (PO):

PO1: Acquire fundamental knowledge and skills

Students should gain fundamental knowledge of microbiology, and the molecular pathways in diverse microbes during their independent life cycle or during their interaction with other organisms. They should also acquire the skills to apply the principle in studying those molecular pathways in various domains of microbial world.

PO2: Critical thinking and research aptitude

Students should understand the fundamental gaps in existing knowledge, critically formulate hypothesis and develop inquisitiveness to address the questions applying the various techniques of molecular microbiology .

PO3: Effective communication and interpersonal skill

Students should engage in scientific discussion, and exchange of ideas through effective communications with their peers and mentors. They should also learn diverse oral presentations and acquire writing abilities.

PO4: Ethics and biosafety practices

Students should understand the importance of ethics in research, should abide by the ethical practices, demonstrate proficiency in biosafety practices and acquire knowledge about intellectual properties rights (IPR).

PO5: Application and Integration of knowledge

Students should apply knowledge of molecular microbiology to answer some emerging questions of medical, agricultural, and industrial microbiology via interdisciplinary and transdisciplinary approaches.

PO6: Environment and Sustainability

Students should be able to understand the rationale of safety procedures and strategies to protect both themselves and the environment via holistic approaches of sustainable development.

Program Outcomes (PO):

PO1: Fundamental knowledge and critical thinking

Students should gain thorough knowledge on various aspects of biology and biotechnology, and the molecular basis of numerous physiological processes in various organisms.

PO2: Critical thinking and research aptitude

Students should identify the scientific problem and are able to apply different biotechnological strategies and techniques to examine the problem, and to interpret results.

PO3: Effective Communication

Students should be able to analyze, and write scientific literature, can communicate clearly in person and through electronic media in English and in any other language he/she feels comfortable and can connect with people to share their ideas and technology.

PO4: Ethics

Students can recognize different IPR and Ethical issues related to practical and research aspects.

PO5: Social Interaction

Elicit views of others, mediate disagreements and help reach conclusions in group settings.

PO6: Environment and Sustainability

Students can be able to understand the issues related to biosafety, environmental biotechnology, and sustainable development.

Program outcomes (PO):

PO1: Fundamental knowledge development

Students should gain a comprehensive understanding of fundamental concepts in biochemistry, cell biology, virology, immunology, microbiology, and related fields, as well as their interrelationships.

PO2: Practical skill development in modern research techniques

Students should be able to apply theoretical knowledge to develop practical skills in recombinant DNA technology, immunological techniques, virological techniques, and other laboratory methodologies.

PO3: Ability to understand new edge experiments and large data analysis

Analyze and interpret data from experiments and research projects using bioinformatics, genomics, proteomics, and statistical analysis.

PO4: Effective communication and interpersonal skill development

Critically evaluate scientific literature and communicate findings effectively through scientific writing, presentations, and group discussions.

PO5: Comprehensive understanding of disease biology and prevention

Apply knowledge of vector biology, vaccine development, medical virology, clinical immunology, and neuroimmunology to address complex problems in healthcare and disease prevention.

PO6: Development of research ethics and biosafety practices

Demonstrate proficiency in biosafety practices and ethical considerations in scientific research, including intellectual property rights and bioethics.

2 year Master of Science Program in Astrophysics

The key features and expected outcomes of the MSc curriculum are:

• A solid understanding of the MSc level core physics courses, compliant with the National Eligibility Test Syllabus

• Extensive skill enhancements in techniques that are required to solve physics/astrophysics problems

• A solid understanding and overview of astrophysics and cosmology for doing research in astrophysics and allied disciplines

• Hands-on training in usage of a telescope through night lab at the 12" telescope at Presidency and possibly internship at other observatories in India for developing a telescope trained human resource.

• A 20-credit research project in order to familiarize the students with philosophy and methodology of research, scientific writing, and science communication.