

Government College, Kariavattom
Department of Biochemistry
FDP in Biochemistry

Program Outcome	<ul style="list-style-type: none"> ➤ To impart knowledge of science as the basic objective of education. ➤ To develop scientific attitude is the major objective to make the students open minded, critical, curious. ➤ To develop skill in practical work, experiments, and laboratory material and equipment along with the collection and interpretation of scientific data to contribute the science. ➤ To understand scientific terms, concepts, facts, phenomenon, and their relationships. ➤ To provide practical experience to the students as a part of course to develop scientific ability to work in the field of research and other fields of their own interest and to make them fit for society. ➤ To create the interest of the society in the subject and scientific hobbies, exhibitions, and other similar activities. ➤ To enrich the students with the latest development in the field of biochemistry, biotechnology and other related field of research and development. ➤ To keep the scientific temper which the students acquire from school level and to develop research culture. ➤ To encourage students to describe and analyze scientific data.
Program Specific Outcome	<ul style="list-style-type: none"> • Develop basic understanding of the various aspects of biochemistry. • Enhance practical skills and competency to conduct experiments in Biochemistry. • Group project helps in creating analytical thinking and interpreting the inference. • Inculcate skill to organize scientific events and effective communication. • Ascertain their area of interest in research.
Course outcome	
BC 1141	Perspectives, Methodology, and Introduction to Biochemistry (Core Course) Objectives of the course: To familiarize the students about the fundamental characteristics of science as a human enterprise and enable them to understand how science works and to impart a general introduction to Biochemistry
BC 1221	General Informatics and Bioinformatics (Foundation Course) Objective of the course: To provide a basic idea about the application of biological data bases and general informatics.
BC 1341	Cellular Biochemistry (Core Course) Objective of the course: To prepare the students for understanding biological systems at cellular level by imparting necessary knowledge that underpins various concepts in Cell Biology and to describe the structural characteristics, functional properties, and regulation of enzymes.
BC 1441	Techniques in Biochemistry (Core Course) Objective of the course: To familiarize the students with the principle, functioning and applications of biological equipment and to introduce them to the basics of research methodology.
BC 1442	Practical IV - P4 (Core Course) Objective of the course: this practical course is aimed to develop skill in the qualitative analysis of biomolecules.
BC 1541	Physiology & Immunology (Core Course) Objective of the course: This course aims at providing an idea regarding the physiological functions of the biological system and to discuss the basics of immunology and immunological techniques.

BC 1542	Bioenergetics and Carbohydrate Metabolism (Core Course) Objective of the course: The course aims at providing an overview of bioenergetics and energy production by explaining the general principles of cellular energy metabolism and schematizing the oxidative pathways of carbohydrates.
BC 1543	Analytical Biochemistry (Core Course) Objective of the course: It aims at enabling the students to understand the fundamentals of Analytical Biochemistry. A sound knowledge of analytical biochemistry will help in understanding the assessment of nutrients, food preservation and food additives.
BC 1544	Classical and Molecular Genetics (Core Course) Objective of the course: To create awareness about the molecular details of the biological system and to describe the events encompassing the central dogma of molecular biology
BC 1545	Practical V – P5 (Core Course) Objective of the course: this practical course aims in developing skill in the quantitative analysis of different biomolecules with accuracy.
BC 1641	Clinical Biochemistry (Core Course) Objective of the course: To introduce the students to the clinical applications of biochemistry and to provide them basic information about microbiology and pharmacology.
BC 1642	Metabolism-II (Core Course) Objective of the course: To detail the metabolic events occurring in the biological system by explaining the different pathways which are aimed at energy production and biosynthesis and to discuss about the diseases caused by inborn errors in metabolism.
BC 1643	Practical VI -P6 (Core Course) Objective of the course: This practical course aims to familiarize the students with the importance of clinical biochemistry and the common parameters that are to be assayed in diagnosis of diseases.
BC 1644	Practical VII –P7 (Core Course) Objective of the course: This practical course aims to familiarize the students with the analysis of nutritional aspects of food.
BC 1646	Immunology and Immunological Techniques (Elective Course) Objective of the course: It aims at enabling the students to understand the fundamentals of Immunology and Immunological techniques. A proper understanding of life processes requires familiarity with the discipline of immunology. A sound knowledge of immunology and techniques will help in understanding assessment of functions, disordered functions, diagnosis and treatment of diseases
BC 1646	Project work Objective of the course: project work is aimed to provide students with hands on training and to provide them expertise in various methods of analysis
BC 1551.1	Clinical Diagnosis of Common Diseases (Open Course) Objective of the course: To provide the fundamental basis for the interpretation of various biochemical tests of diseased conditions.
BC 1551.2	Lifestyle Diseases (Open Course) Objective of the course: To create general awareness among students about the various diseases associated with lifestyle and which could be prevented by controlling the lifestyle.

DEPARTMENT OF BIOTECHNOLOGY

Programme Offered: BSc Biotechnology Multimajor 2(b)

Program outcomes

The various courses in the programme is aimed to develop proficiency in the theory as well as practical experiments, common equipments, laboratory, along with the collection and interpretation and presentation of scientific data in proper manner.

Programme Specific Outcomes

The Career related first degree programme in Group 2(b) Biotechnology as one of the core subjects is designed to develop a scientific attitude and an interest towards the modern areas of biotechnology in particular and life science in general.

The programme will help the students to become critical and curious in their outlook. The courses are designed to impart the essential basics in chemistry, Botany, Zoology and Biotechnology.

The various courses in the programme is aimed to develop proficiency in the theory as well as practical experiments, common equipments, laboratory, along with the collection and interpretation and presentation of scientific data in proper manner.

The students will be equipped with knowledge in the modern areas of biotechnology and its application in medical science, environment, agriculture, industry, proteomics, genomics, metabolomics, bioinformatics, nanobiotechnology etc.

Apart from understanding biotechnology and its power in developing the nation, it will create awareness about biotechnology and will help in eliminating public fear about the contribution of biotechnology and confusion on GM crops, GM foods and transgenic organisms.

Students, who pursue this programme and pass out successfully, will surely have an urge to continue higher studies in Biotechnology and contribute significantly in its development.

Course Outcome

- Develop basic understanding of the various streams of biotechnology
- Enhance practical skills and competency to conduct experiments in biotechnology
- Group project helps in creating analytical thinking and interpreting the inference
- inculcate skill to organize scientific events and effective communication
- Ascertain their area of interest in research

SEMESTER I

Foundation Course I

BV 1121 Methodology and Perspective of Biotechnology

- The students will be able to understand how science works.
- Students will learn how to apply statistics and IT in Biological science.

- They will receive a general awareness about biotechnology and its application in various fields.

SEMESTER II

Foundation Course II

BV1221 Biophysics & Instrumentation

- The students will be able to understand the fundamentals of biophysics
- the general instrumental techniques used in biotechnology.

Core Course: BV1245 Microbiology

Student will be able to understand the scope of microbiology in various fields such as pharmacy, medicine, clinical research, agriculture, dairy industry, water industry and gain practical knowledge in handling and culturing microbes

SEMESTER III

Core Course: BV1344 Food and Industrial Biotechnology

The students will be introduced to the industrial application of Food Biotechnology and Bioprocess technology.

Students should be trained to understand commercial importance of biotechnology through its industrial aspects

BV1345 Molecular Biology

Molecular biology is basis of modern biology and biotechnology.

This course imparts a very essential foundation for the proper understanding of life at molecular level, which is essential for further studies related to genetic engineering, immunology and other modern applied aspects of biology.

SEMESTER IV

Core Course: BV 1446 Recombinant DNA Technology

The students gain basic understanding on gene manipulation methods and principles

SEMESTER IV

Core Course: BV1447 Immunology

To give a basic training to the students of Biotechnology on immune system, immunology and immunology related techniques.

SEMESTER V

Core Course: BV1544 Environmental Biotechnology

This course is concerned with the application of biotechnology in keeping the environment clean and healthy and application of biotechnology in energy production. Various techniques are described and will be benefited by the students in their higher studies in biotechnology.

Core Course: BV 1545 Plant Biotechnology & Animal Biotechnology

This course is designed to impart basic knowledge in the applied aspects of plant biotechnology and animal biotechnology for the improvement of agriculture and plant based and animal based industries. It gives an introduction about the various techniques of animal cell culture, cloning and tissue culture of plants and animals.

Elective course for Biotechnology students

BV 1648 Bioinformatics and Nanobiotechnology

This course is for biotechnology students, who are interested to know about the methods and application of bioinformatics and modern Nano-biomolecules and their contribution in the various fields of biotechnology and healthcare.

BSc Computer Science Syllabus 2015

Semester 1

Programme Outcomes

- PO1-To create overall generic awareness about scope of the field of IT and to impart basic personal computing skills,
- PO2-To identify formulate, analyze and develop solutions to computational challenging issues. PO3-To understand the professional, ethical, legal, security, and social issues and responsibilities of a professional.
- PO4-To develop scientific and technical knowledge
- PO5-To develop the capability to use and implement appropriate, state of art and cutting edge techniques, skills, and tools.
- PO6-To develop and collaborate in multidisciplinary settings
- PO7-To excel in problem Analysis
- PO8-To recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the context of the rapidly evolving technological scenario.
- PO9- To have the ability to function as teams , communicate effectively and engage with diverse stakeholders
- PO10- To understand the need of professional software solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

Programme Specific Outcomes

- PSO1-To develop the capability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computational systems
- PSO2-to demonstrate mastery of Computer Science in the following core knowledge areas of Data Structures , Programming Languages , Databases, Software Engineering , Computer Architecture
- PSO3-To apply problem-solving skills and the knowledge of computer science to solve real world problems.
- PSO4-To develop technical project reports and presentations

Course Outcomes

Semester 1

Course Code	Course Name and Course Objectives
EN1111.4	Speaking and listening skills
CO1	Listen to lectures, public announcements and news on TV and radio.
CO2	Engage in telephonic conversation.
CO3	Communicate effectively and accurately in English.
CO4	Use spoken language for various purposes
MM1231.10	Mathematics I
CO1	To introduce advanced differential calculus
CO2	To introduce solutions of differential equations
CO3	To introduce Number theory
CO4	To introduce the concept of Complex Number Theory
CS1121	Introduction to IT
CO1	To introduce the basic terminology in the field of IT
CO2	To impart functional knowledge about PC hardware, operations and concepts
CO3	To impart functional knowledge in the use of GUI Operating System
CO4	To impart functional knowledge in a standard office package (word processor, spread sheet and presentation softwares) and popular utilities
CS1131	Digital Electronics
CO1	Remember the basic concepts of electronics
CO2	Familiarise the concept of different number systems
CO3	Understanding the properties of logic gates
CO4	Apply different techniques and theorems to simplify the sop forms
CO5	Analyse the characteristics of different combinational logic circuits.

CS1141	Introduction to Programming
CO1	Remember the basics of computer
CO2	Understand the structure of program writing
CO3	Apply control structures and pointers
CO4	Analyze userdefined functions
CO5	Understand dynamic memory allocation
CO6	Understand string handling functions

CS1142	Programming Lab – I
CO1	Testing out and interpreting a variety of simple programs
CO2	To demonstrate the syntax and use of the following features of the language: basic data types, operators and control structures.
CO3	To develop programming solutions to problems including program design, algorithm development and data structure selection.
CO4	To understand and implement functions, creation and usage of files

CS1132	Digital Electronics Lab
CO1	To familiarise with various components-Resistors, Capacitors, Diode, LED, Zener Diode and transistor.
CO2	Diode characteristics (forward and reverse)
CO3	Clipping circuits (series clippers)
CO4	Verification of truth table of logic gates

Semester 2

EN1211.4	Writing and presentation skills
CO1	Understand the mechanism of general and academic writing.
CO2	Recognize the different modes of writing
CO3	Improve their reference skills, take notes, refer and document data and materials
CO4	Prepare and present seminar papers and project reports effectively
MM1231.10	Mathematics II
CO1	To introduce proof methods in mathematics and mathematical logic
CO2	To review concepts and techniques of set theory, relations and functions
CO3	To introduce various algebraic structures
CO4	To introduce graph theory
CO5	To develop an excitement in mathematics by highlighting its hidden beauty and significance

CS1221	Computer Organization & Architecture
CO1:	Remember the basic concepts of computers.
CO2:.	Understand the functional units of a standard PC and its working
CO3:	Understand the architectural features of 8086 processor.
CO4:	Create assembly language programs for 8086 processor.
CO5:	Apply the tools debug, TASM/ MASM.

CS1241	Data Structures
CO1	Remember purpose of Data Structures
CO2	Understand different Data Structures
CO3	Apply programming languages
CO4	Analyze working of different data structures
CO5	Evaluate expressions
CO6	Create different Data Structures

CS1242	Object Oriented Programming
CO1	Understand the concepts of classes and object
CO2	Define classes for a given situation and instantiate objects for specific problem solving
CO3	Reuse available classes after modifications if possible
CO4	To assess and impart skills in OOPS

CS1243	Programming Lab -II
CO1	To understand about basic data types and control structures in C++.
CO2	To manage classes and objects in a variety of situations
CO3	To solve moderately complex problems involving the above
CO4	To appropriately select structures and algorithms

CS1244	Data Structures lab
CO1	Implementation of different searching techniques.
CO2	Implementation of different sorting techniques.
CO3	Stack and Queue Array Implementation
CO4	Tree traversal

Semester 3

CS1341	Principles of Management
CO1:	Concept of Management and Organisations
CO2:.	Planning and decision making strategies
CO3:	Concepts of Organizational Behaviour and HR Management
CO4:	Leadership qualities

CS1342	Software Engineering
CO1:	Appreciate the importance of having a process for software development.
CO2:.	Understand the various activities undertaken for a software development project following the Function oriented Design & Object oriented design
CO3:	Understand the issues in code design and development
CO4:	Test software developed using SSAD and OOAD methodologies

CS1343	Operating Systems
CO1:	Fundamental concepts of systems software
CO2:.	To understand Functions of operating systems as a resource manager
CO3:	To understand the Strategies for constrained resource allocation, process scheduling
CO4:	To understand Memory and I/O Management techniques

CS1344	Internet Programming
CO1:	To impart basic skills in moderately complex use of the following tools/scripts/languages: HTML, DHTML, CGI Script, Perl, CSS, Javascript, ASP and JSP.
CO2:.	To impart necessary ability to choose the appropriate web tools/languages for creating state-of-the art websites
CO3:	To Expose students to current trends and styles in web design and applications
CO4:	

CS1345	Microprocessor and peripherals
CO1:	Appreciate architectural features of x86 family of processors
CO2:.	Read and write moderately complex assembly programs for 8086 processor
CO3:	Use the tools debug, TASM/MASM, Unix/Linux Codeview
CO4:	Use assembly routines in C/C++

CS1346	Programming Lab III
CO1:	Practice to use assembly language development tools like debug, TASM/MASM, Unix/Linux Codeview
CO2:.	Practice majority of 8086 instruction set through simple Examples
CO3:	Develop moderately complex assembly programs for 8086 processor
CO4:	Develop assembly routines in C/C++

CS1347	Internet Programming Lab
CO1:	To practice moderately complex use of the following scripts/languages/technologies: HTML, DHTML, CSS, Javascript, CGI Script, Perl,

Semester 4

CS1441	Design and Analysis of Algorithms
CO1:	To be able to analyse the complexity of algorithms and also be able to select good algorithms from among multiple solutions for a problem
CO2:.	To understand fundamental strategies of algorithm design
CO3:	To Have better awareness on complex algorithm design strategies
CO4:	To Implement some typical algorithms

CS1442	Database Management Systems
CO1:	To be aware of basic concepts of data bases and data base management systems
CO2:.	To understand the concepts of relational data bases.
CO3:	To Know to normalize relational data bases Skilled in using relational algebra and relational calculus
CO4:	To Develop skills to write database queries

CS1443	Computer Networks
CO1:	To be aware of evolution of development of networks
CO2:.	To understand the basic transmission technologies and characteristics
CO3:	To understand the use of layer architecture for networking systems
CO4:	To understand the main design issues of transport protocols and the mechanism to control traffic flow and congestion

CS1444	Programming in Java
CO1:	To install and work with JDK, also make them aware the use of java docs
CO2:.	To Practice basic data types, operators and control structures in Java and basic handling of classes and objects in Java
CO3:	To introduce and understand the following selected APIs: I/O, Strings, Threads, AWT, Applet, Networking
CO4:	To be able to approach and use a new package

CS1445	Minor Project
CO1:	To prepare for the major project
CO2:.	To inculcate team spirit
CO3:	To contribute in achieving some of the objectives of the major project.
CO4:	To serve as an opportunity for producing and distributing socially useful software

CS1446	Programming Lab – IV
CO1:	To understand basic data types and control structures in Java installing and using JDK
CO2:.	To write applications and applets
CO3:	To manage classes and objects in a variety of situations using i/o, string, threads and net APIs
CO4:	To solve moderately complex problems involving the above

CS1447	Databases Lab
CO1:	Installing and configuring a proper SQL tool
CO2:.	Database design and implementation

CO3:	Writing and analysing SQL statements
CO4:	Create user interface (using java AWT) and study the working of a data base in a front end application

Semester 5

CS1542	System Software
CO1:	To understand the internal working of the system
CO2:.	To understand and assess the functioning of assemblers
CO3:	To understand the working of loaders and linkers
CO4:	To identify and use system development tools

CS1543	Computer Graphics
CO1:	handle basic graphic primitives in C/C++ for developing 2D and 3D graphics program basic scan-conversion algorithms
CO2:.	apply various transformations to 2D and 3D graphic objects
CO3:	derive various projections of 3D objects give realistic rendering to 3D wireframe objects
CO4:	be familiar with current trends in computer graphics

CS1551.1	Open Course- Internet Technology
CO1:	To understand about the various components of internet
CO2:.	To understand and identify different devices used for networking
CO3:	To identify the working principle of Internet
CO4:	Design web pages using HTML

CS1551.2	Open Course- Linux Environment
CO1:	To understand about Operating systems
CO2:.	To understand about Open source systems
CO3:	To understand about linux OS
CO4:	To use and implement in OpenOffice.org

CS1551.3	Open Course- Business Informatics
CO1:	To understand the role of IT in business
CO2:.	To impart knowledge of basic concepts of e-commerce
CO3:	To understand the different types of e-commerce web sites and different modes of payments
CO4:	To understand and identify security and legal issues in e-commerce

CS1561.1	Elective- Multimedia
CO1:	To understand the features of text, audio, images, video and active contents
CO2:.	To understand the file formats for the above elements
CO3:	To identify the application softwares used to process the above elements
CO4:	To understand about the various applications of multimedia

CS1561.2	Elective- Bioinformatics
CO1:	To understand the concepts of basic Biology
CO2:.	Develop ideas on representing the biological terms in Computer Science.
CO3:	To identify and assess the developments in the emerging field of Bioinformatics.

CS1561.3	Elective- Trends in Computing
CO1:	To Understand the concepts of grid computing
CO2:.	To understand how users can log into different systems in the cloud and access software and hardware resources
CO3:	To understand and implement problem solving with uncertainty, imprecision and partial truth using soft computing techniques

CS1544	Computer Graphics Lab
CO1:	implement basic scan-conversion algorithms implement clipping algorithms
CO2:.	implement various transformations to 2D and 3D graphic objects
CO3:	implement orthographic and perspective projections of 3D objects
CO4:	create 3D wireframe objects

CS1545	Free and Open Source Software (Foss) Lab
CO1:	Installing and Configuring Linux,
CO2:.	To create Partitions
CO3:	To understand and use basic Linux commands
CO4:	Introduction to vi editor

Semester 6

CS1641	Introduction to Information Security
CO1:	To understand the principles and protocols of internetworks and basic issues in information security
CO2:.	To understand the concept of ciphers and cryptography.
CO3:	To impart an idea on various ciphers
CO4:	To understand the concept of digital signatures and e-mail security policies to impart an idea on malicious software and remedies

CS1642	Artificial Intelligence
CO1:	To introduce the notion of machine intelligence To introduce the symbolic processing paradigm of AI and algorithms for state space search
CO2:.	To introduce the knowledge representation formalism To introduce basics concepts and challenges of Robotics
CO3:	To introduce basics concepts and challenges of Speech and Language Processing
CO4:	To introduce basics concepts and challenges of Expert systems To give basic introduction to some of the tools/languages used in AI field

CS1643	E-Commerce & E-Governance
CO1:	To understand the role of IT in business
CO2:.	To understand the basic concepts of e-commerce
CO3:	To understand and identify different types of e-commerce web sites and different modes of payments
CO4:	To understand the security and legal issues in e-commerce

CS1661.1	Mobile Computing
CO1:	To introduce technology of mobile phones and pocket computers

CO2:.	To introduce applications of WAP
CO3:	To introduce wireless communication technology such as GPRS
CO4:	To impart basic idea on portal servers, data synchronization

CS1661.2	Embedded Systems
CO1:	To introduce embedded systems architecture
CO2:.	To introduce embedded operating systems
CO3:	To introduce embedded system software development using C
CO4:	To introduce various applications of embedded systems

CS1661.3	Data Mining & Data Warehousing
CO1:	To get an understanding of the general properties of data in large databases
CO2:.	To Understand a variety of real-world applications that require mining
CO3:	To identify data warehousing and different data mining techniques
CO4:	To implement and discover useful patterns and associations in huge quantities of data

CS1644	Major Project & Viva
CO1:	To provide an opportunity to apply the knowledge gained through various courses in solving a real life problem
CO2:.	To provide an opportunity to practice different phases of software/system development life cycle
CO3:	To introduce the student to a professional environment and/or style typical of a global IT industry
CO4:	To provide an opportunity for structured team work and project management
CO5	To provide an opportunity for effective, real-life, technical documentation
CO6	To provide an opportunity to practice time, resource and person management

DEPARTMENT OF CHEMISTRY

Programme Offered: B. Sc. Chemistry and Industrial Chemistry

Program Outcome: The program outcome that the Department of Chemistry expects from the student who pass out is to gain an overall theoretical as well as practical knowledge in three major areas of chemistry i.e., Physical, Inorganic and Organic chemistry. The following learning goals and objectives are anticipated from graduation at the end of the programme:

1. Students should be able to acquire an understanding of chemical bonding and structure of atoms, solid state, liquid and gaseous state properties of matter, kinetics in order to understand the rates of reactions.
2. In order to familiarize the students with various environmental aspects, different natural resources, biodiversity conservation, understand the need for conservation of ecosystems, various harmful effects of different types of pollution, their syllabus was designed with the intention of addressing all the above topics thereby creating an environmental awareness in their mind and analyze the social issues related to environment.
3. Nanomaterials, Green chemistry and supramolecular chemistry are recent fast developing areas of wide interest. A flavour in those subjects are also provided.
4. In the organic chemistry topics, they understand the behaviour of different kinds of aliphatic and aromatic compounds, their preparation and properties, their stereochemistry and also they gain an understanding of mechanism of various reactions taking place. They also learn about special bioorganic compounds like proteins, nucleic acids, oils, fats, vitamins, hormones, enzymes etc.
5. In inorganic chemistry they get a detailed understanding of theories of coordination, how metals combine with organic compounds which leads to the exciting field of organometallic chemistry. In this context the important application of metal ions in biological systems also studied.
6. In order to make the students aware of different states of matter, liquid crystals, basics of group theory and quantum mechanics, various thermodynamic principles and properties including statistical thermodynamics, developing field such as spectroscopy are taught which could be considered as the curtain raiser for their future master programmes.
7. The main attraction of this course compared to other BSc chemistry course is that during the second and third year they learn about a large number of industrially important materials such as Glass, cement, soap, refractories, ceramics, paints, fertilizers etc., their manufacture and properties and uses, basic concepts of cosmetics, different techniques in food processing, dyeing etc. Different methods of extraction of metals from their ores and different stages of purification are described in detail. Industrial aspects of organic chemistry is also highlighted such as application in non renewable energy sources such as coal, natural gas, crude oil etc. They also need to study about different local chemical industries in Kerala and they also pay visit for their projects. Basics of polymer industry is also studied. Various separation and purification techniques, processes in organic chemical manufacture, industrial waste water treatment methods, how to combat different kinds of pollution such as air, water etc., are also studied.
8. After understanding the basic principles of various analytical techniques, they apply in their practicals. Utilizing practical classes they are enabled to make a qualitative analysis of

different cations and anions in a given mixture of solution, determine the weight of elements by using gravimetric analysis, volumetric titration experiments in order to make a quantitative analysis of compounds. Determine the hardness, pH and total dissolved solids in waste water, develop skill in organic compound analysis, gravimetric estimation and determination of physical constants.

Programme Specific Outcomes: Chemistry and Industrial Chemistry course is designed in such a way that they gain an overall knowledge in different areas of chemistry like physical, inorganic and organic and also special emphasis in Industrial Chemistry. Also flavor of recent areas of research are given to them. The programme is adapted to meet specific educational and professional goals in mind of students. Students are sent to chemical industries for their project work during the last semester of the course to make students familiar with the important chemical processing used in the manufacture of chemicals in the industry including the raw materials. It gives the students an idea about the necessary steps required to assist any industrial project. After completing the course, the students will be adequately prepared to pursue masters in the field.

Course	Objectives
Organic chemistry I	<ul style="list-style-type: none"> • Learns the behaviour of aliphatic and aromatic compounds like aromatic aldehyde, ketones and halides. • The students get an idea of mechanism of reactions of organic compound and hybridization. Comprehend the knowledge about earth's interior
Physical chemistry I	<ul style="list-style-type: none"> • Aware of different states of matter, liquid crystal • Basics of group theory and thermodynamic property like entropy, enthalpy and free energy
Industrial chemistry I	<ul style="list-style-type: none"> • Basic knowledge of industrial aspects of Inorganic chemistry and organic chemistry. • Know the procedure of separation and purification techniques. • Gain sound knowledge of inorganic material.
Inorganic Chemistry I	<ul style="list-style-type: none"> • To give an idea about atom, periodic properties of elements, chemical bonding and theory of bonding. • Familiarize the theoretical aspects of atomic structure. • To develop basic knowledge regarding the evaluation of analytical data. • Familiarize the principles of chemical analysis. • Acquire basic laboratory skills required for chemical analysis.
Methodology and Informatics	<ul style="list-style-type: none"> • Appreciate the role of science in the development of human culture.

	<ul style="list-style-type: none"> Analyse the need of Information technology in human development. Familiarise chemistry related soft wares. Acquire knowledge on basics of cheminformatics.
Inorganic chemistry II	<ul style="list-style-type: none"> Distinguish various theories of chemical bonding. Predicting the geometry of molecules Compare various concepts of acid-base Create basic knowledge on nuclear chemistry. To develop elementary idea about nanochemistry.
Environmental Studies	<ul style="list-style-type: none"> Familiarise structure and functions of environment. Understand the natural resources, ecosystem and biodiversity. Analyse the social issues related to environment. Understand the need for conservation of ecosystems.
Chemistry Lab I and II	<ul style="list-style-type: none"> To familiarise the Inorganic qualitative analysis. To acquire skills on systematic analysis of various cations and anions.
Physical Chemistry II	<ul style="list-style-type: none"> Introduce the basis of developing fields such as spectroscopy, quantum mechanics and statistical thermodynamics
Inorganic Chemistry III	<ul style="list-style-type: none"> Understand how the transition metal co-ordinate the theories of coordination How metals combine with organic compounds to form organometallic compound role of metal ions in biological systems
Industrial Chemistry II	<ul style="list-style-type: none"> Learn the basic concept of polymers. Basic knowledge of chemistry of cosmetics, dyes paint, soaps, detergents and food processing
Organic Chemistry – II	<ul style="list-style-type: none"> Get an interesting idea about the stereochemistry of organic compounds Point out the various methods of preparation and properties of organic compounds
Industrial Chemistry- III	<ul style="list-style-type: none"> Introduce the chemistry of various polymers and polymerization techniques Develop an idea about organic spectroscopy.
Industrial Chemistry - IV	<ul style="list-style-type: none"> Analyze the structure of organic compounds based on various spectroscopic techniques Acquire knowledge about various heterocyclic

	<p>compounds</p> <ul style="list-style-type: none"> • Develop an interest in rational drug design
Physical Chemistry- III	<ul style="list-style-type: none"> • Emphasize the principles of electrochemistry including the conductance and emf of cells • Acquire knowledge of phase equilibria to design various chemical processes • Determine the rate of chemical reactions • Understand binary liquid mixtures
Industrial Chemistry-V	<ul style="list-style-type: none"> • Establish the concept of various organic processes employed in industry • Identify the causes and effects of environmental pollution
Industrial Chemistry-VI	<ul style="list-style-type: none"> • Get idea about the various control measures of air pollution • Generate an interest to protect the water resources • Acquire knowledge about industrial waste water treatment
Supramolecular, NanoandGreen Chemistry	<ul style="list-style-type: none"> • Build an idea about the significance of green chemistry • Identify the advantages of microscale experiments • Recognize the various approaches for the synthesis of nanomaterials and their applications • Acquire knowledge about supramolecular chemistry
Practical Chemistry	<ul style="list-style-type: none"> • Develop skill in organic compound analysis, gravimetric estimation and determination of physical constants
Industrial Chemistry Lab	<ul style="list-style-type: none"> • Determine the hardness, pH and total dissolved solids in waste water
Project	<ul style="list-style-type: none"> • To make students familiar with the important chemical processing used in the manufacture of chemicals in the industry including the raw materials • Give the students an idea about the necessary steps required to assist any industrial project

PROGRAMME OUTCOMES OF VARIOUS DEPARTMENTS

DEPARTMENT OF GEOGRAPHY

Programme Offered: B. Sc. Geography

Program Outcome

To impart the skills required to gather information from resources and use them.

To equip the students in gathering spatial information, analyse, synthesize and to suggest solutions to Geographical problems

Program Outcome: The general outcome that the Department of Geography in the college expects from those who majors in the discipline is to be accomplished in disciplinary theories, methodologies, and content and its practicality in real world situation. The following learning goals and objectives are anticipated from graduation at the end of the programme:

1. Students should be able to acquire an understanding of and appreciation for the relationship between geography and culture. Articulate the theories, philosophies, and concepts in the discipline of geography, including unifying themes of spatial patterns and structures, the interrelationship between people and places, and the interactions between nature and society.
2. A general understanding of geographic processes, the global distribution of landforms and ecosystems, and the role of the physical environment on human populations there by creating an inbuilt environmental awareness progressively.
3. Students are able to read, interpret, and generate maps and other geographic representations as well as extract, analyze, and present such information from a spatial point of view.
4. Students acquire an understanding of and appreciation for the role that geography can play in sustainable life management
5. Students get an understanding of current global population pattern, factors influencing the distribution and mobility of human populations including settlement and economic activities and networks and their impacts on the physical environment.
6. Students are able to correlate past with the present using various geographic so as to plan for the future.
7. Students are capable to estimate the contradictory agenda of society's various stakeholders and the need to reconcile environmental, economic and socio-cultural concerns.
8. Students enhance their personality through learning human geography
9. Students are able to synthesize geographic knowledge and apply innovative research strategies to solve problems in resource conservation, environmental degradation, and sustainable development within the community, region and the world.
10. Students can identify and assess how geographic concepts apply in the place of work and in day to day life to solve real-world problems.

Specific Outcomes: Geography mainly concerns with the changes in spatial characteristic of a phenomenon in a temporal perspective. The B.Sc. programme in geography is adapted to meet specific educational and professional goals in mind of students. It focuses on spatial studies both qualitative as well as quantitative, with much emphasize on human-environment relationship. After completing the course, the students will be adequately prepared to pursue masters in the fields as well as for professional careers in geography and allied disciplines like Spatial technology what the world witness today.

Course	Objectives
Principles of Geomorphology	<ul style="list-style-type: none"> • Appreciate earth's tectonic and structural evolution • Comprehend the knowledge about earth's interior • Develop an idea about concept of plate tectonics, and resultant landforms • Identify various endogenic & exogenic forces of earth
Fundamentals of GIS & Remote Sensing	Perform basic ways of maps generation through GIS and ways to generate the data collected through satellites
Climatology & Oceanography	<ul style="list-style-type: none"> • Link atmospheric and climatic elements with other science disciplines • Develop an idea about cyclones • Investigate the mechanism of monsoon
Human Geography	<ul style="list-style-type: none"> • Correlate various elements of human environment with their real world practices and events • Analyze the problems of physical as well as cultural environments of both rural and urban areas
Maps & Scales: Practical 1	<ul style="list-style-type: none"> • Learn to draw the projections of many cartography diagram and apply this is in different statistical data • Able to select the appropriate scale & technique for graphical presentation of a maps and data • learn graphically about the enlargement and reduction of maps
Geography of India	<ul style="list-style-type: none"> • Identify various land formation, climate and natural vegetation • Evaluate the economic resources of India • Examine economic & social distribution of population of the country • Develop an idea about agricultural and industrial regionalisation of India
Geography of Kerala	<ul style="list-style-type: none"> • Identify various land formation, climate and natural vegetation of the state • Evaluate the economic and human resources of the state • Examine economic & social development of population
Geography of Resources	<ul style="list-style-type: none"> • Identify spatial distribution of various resources in the world • Recognize various resource depletion causes and potential

	<ul style="list-style-type: none"> threats Find out possible practical solutions for 4R's concept
World Regional Geography	Correlate natural and cultural regions of the world
Cartography	<ul style="list-style-type: none"> Develop an idea on the development of maps and chart chronologically Acquire knowledge on different types of thematic mapping techniques Identify the stages of development of a raw data to a final map
Environmental Geography	<ul style="list-style-type: none"> Develop an idea about human-nature relationships Build an idea about ecosystem and its various cycles Observe various environmental issues of the world Evaluate environmental programmes and policies of the government
An Introduction to Disaster Management	<ul style="list-style-type: none"> Gain knowledge about approaches to hazard study Develop ideas on factors, consequences and management of various natural disasters Acquire knowledge about human induced disaster and policies to reduce the events
Weather & Climatic Data Analysis: Practical 2	<ul style="list-style-type: none"> Develop an idea about different types of thematic mapping techniques Interpret weather charts and bulletins of IMD and other meteorological departments
Map Interpretation: Practical 3	Gain knowledge about topographical maps and apply this knowledge in ground surface
Surveying: Practical 4	Conduct different types of surveying instruments like Indian clinometers, prismatic compass, dumpy level etc.
Project	<ul style="list-style-type: none"> Conduct a social/environmental survey project in relation to their discipline so as to measuring the status of development of a particular section/area in relation to environment <p>Find out the possible measures to solve those problems that arise due to several human interventions as part of such developments</p>

Besides, the department conducts Physical geography as open course for other departments to ensure their responsibilities and positive attitude among the learners in building a sustainable green environment.

GOVERNMENT COLLEGE KARIAVATTOM

DEPARTMENT OF PHYSICS

PROGRAMME AND COURSE OUTCOME

2. Programme Offered: B. Sc. Physics and Computer Application

2.a Objectives

B. Sc Physics and Computer Application is an interdisciplinary undergraduate level program of University of Kerala is to equip the students for pursuing higher studies and employment in any branches of Physics, Computer Science and related areas. The Physics related part of the program also envisages developing thorough and in-depth knowledge in Classical Mechanics, Quantum Mechanics, Statistical Physics, Optics, Electrodynamics, Nuclear Physics, Solid state physics and Electronics. The program also offers course in t Environmental Science and Astrophysics and Astronomy. The program also aims to enhance problem solving skills of students so that they will be well equipped to tackle national level competitive exams. The program also acts as a bridge between theoretical knowhow and its implementation in experimental scenario. The program also introduces the students to the scientific research approach in defining problems, execution through analytical methods and systematic presentation of results keeping in line with the research ethics through under graduate level dissertations.

2.b Program Outcome:

- Define and explain fundamental ideas and mathematical formalism of theoretical and applied physics.
- Identify, classify and extrapolate the physical concepts and related mathematical methods to formulate and solve real physical problems.
- Identify and solve interdisciplinary problems that require simultaneous implementation of concepts from different branches of physics, computer science and other related areas.
- To define a research problem, translate ideas into working models, interpret the data collected draw the conclusions and report scientific data in the form of dissertation.

- To disseminate scientific knowledge and scientific temper in the society to contribute towards greater human cause.

2.c Course Outcome:

Course Code/Name	Objectives/Outcome
<p>PC1121-Mechanics, Thermodynamics and Properties of Matter</p>	<p>Objectives This course is aimed to provide basic concepts from mechanics, thermodynamics and properties of matter. The course discusses dynamics of rigid bodies, preliminary ideas from thermodynamics, basic concepts from elasticity, fluid mechanics and transference of heat</p> <p>Outcome</p> <ul style="list-style-type: none"> • To learn the concepts rigid body dynamics and apply the concepts for calculation of moment of inertia of objects with different geometry • To illustrate the principle of thermodynamic systems, relate them to explain the working of heat engines • To demonstrate experiments from mechanics such as bending of beams • To classify stream line and turbulent flow, to develop applications using bernoullies theorem, To demonstrate experiments with surface tension methods • To apply thermal conductivity principles for selecting objects with desired conductivity
<p>PC1241-Environmental studies</p>	<p>Objectives This course aims a multidisciplinary approach, which covers natural recourses, ecosystem, renewable and non-renewable energy sources, biodiversity and its conservation, environmental pollution, social issues and environment.</p> <p>Outcome</p> <ul style="list-style-type: none"> • To illustrate on scope and importance of environmental studies • To justify the controlled use of non-renewable energy resources • To classify ecosystems • To identify biodiversity hot-spots and analyze bio-diversity conservation issues • To classify various environmental pollution and examine issues like solid waste management • To outline existing environmental laws and act

	<ul style="list-style-type: none"> • To relate the ill effects of population on environment • To identify and solve the local environmental issues through field visits
<p>PC1341- Electrodynamics</p>	<p>Objectives This course is aimed to introduce the students the fundamental concepts from electricity, electrodynamics and magnetism.</p> <p>Outcome</p> <ul style="list-style-type: none"> • To define, explain and illustrate fundamental concepts from electricity, magnetism and electrodynamics • To apply fundamental laws like Gauss's law etc. to solve problems and formulations from electricity, magnetism and electrodynamics • To explain and illustrate alternating current and AC circuits. • To illustrate and design electric circuits using circuit theory.
<p>PC1441-Classical Mechanics and Theory of relativity</p>	<p>Objectives This course aims to provide fundamental concepts on classical mechanics and theory of relativity, which includes principles from oscillations, central force motion, Lagrangian dynamics and special theory of relativity</p> <p>Outcome</p> <ul style="list-style-type: none"> • To explain and illustrate concepts from oscillations and apply the principles determine acceleration due to gravity • To explain and illustrate planetary motion using the concepts of central force • To explain and illustrate Lagrangian dynamics • To explain and illustrate special theory of relativity
	<p>Objectives This course is aimed to introduce the concepts of optics from Interference, diffraction, polarization, diffraction and advanced topics such as Laser and Fibre optics.</p>

<p>PC1441-Optics</p>	<p>Outcome</p> <ul style="list-style-type: none"> • To explain and illustrate the interference concept and apply and design experiments to determine optical properties of materials • To explain and illustrate the concepts of diffraction using mathematical theory using Fresnel and Faunhoffer approach and apply the diffraction principles to determine optical properties of materials • To explain and illustrate the concept of dispersion • To explain and illustrate the principles of laser and optical fibre.
<p>PC1541-Electronics</p>	<p>Objectives This course aims a thorough understanding on electronics via courses on diode circuits, transistors, power amplifier, feedback and oscillator circuits, modulation circuits, operational amplifier and digital electronics</p> <p>Outcome</p> <ul style="list-style-type: none"> • To explain and illustrate diode characteristics, zener diode characteristics and concepts such as modulation • To explain and illustrate transistor characteristics , power amplifiers, oscillator circuits • To illustrate and design operational amplifier and its circuits • To explain fundamentals of digital electronics
<p>PC1542-Atomic and Nuclear Physics</p>	<p>Objectives This course aims a thorough conceptual understanding of vector atom model, atomic spectra, molecular spectra, nucleus, radio activity, nuclear fission , nuclear fusion and elementary particles</p>

	<p>Outcome</p> <ul style="list-style-type: none"> • To summarize different quantum numbers and explain the origin of various quantum numbers • To Interpret various spectral terms and notations • To Estimate atomic and nuclear parameters based on spectral analysis • To list and illustrate various nuclear models • To summarize various phenomena associated with radioactivity • To explain nuclear fission and nuclear fusion and classify various reactors • To classify various elementary particles based on their various conservation laws and properties
<p>PC1641-Solid State Physics</p>	<p>Objectives This course aims a thorough conceptual understanding on crystal structures, electrical, thermal and optical , magnetic, superconducting and dielectric properties of solids</p> <p>Outcome</p> <ul style="list-style-type: none"> • To illustrate and classify different crystal structures • To explain electrical properties of metals using free electron theory • To explain and illustrate thermal, optical, magnetic and dielectric properties of solids using different physical models • To explain superconducting nature of solids
<p>PC1642-Statistical Physics and Quantum Mechanics</p>	<p>Objectives This course aims to equip the students with the fundamentals of statistical mechanics and quantum mechanics, and acquaint them with some simple examples that demonstrate these concepts.</p> <p>Outcome</p> <ul style="list-style-type: none"> • To illustrate and explain the theory of ensembles • To apply the ensemble theory to a system of

	<p>non-interacting particles, both quantum and classical</p> <ul style="list-style-type: none"> • To illustrate the principles of quantum mechanics • To apply quantum theory to some simple, exactly solvable one dimensional problems
<p>PC1661.1 Astronomy and Astrophysics</p>	<p>Objectives This course aims to impart special knowledge and understanding on astrophysics and astronomy. This course designed to provide overview of basic concepts from astronomy and astrophysics, birth and evolution of universe, ideas on microwave background radiation, the solar system, evolution of stellar systems and astronomical aspects of earth.</p> <p>Outcome</p> <ul style="list-style-type: none"> • To illustrate the methods of astronomy and astrophysics • To illustrate the birth of universe and historical developments in astronomy • To explain the evolution of cosmic bodies like stars, black hole, supernova, galaxies etc. • To explain the formation and evolution of planets, comets, asteroid, meteorites • To demonstrate concepts like origin of seasons
<p>PC1242-Practicals-Mechanics, Properties of Matter, Heat and Acoustics</p>	<p>Objectives This course aimed to impart knowledge and skill for students through setting up and demonstration of various physics experiments from mechanics, properties of matter and acoustics</p> <p>Outcome</p> <ul style="list-style-type: none"> • To measure and analyze various physical quantities from mechanics such as Youngs modulus from mechanics and related areas. • To compare the merits and demerits of various methods for determination of a physical quantity • To analyze and compare thermal conductivity materials

	<ul style="list-style-type: none"> To develop experimental skills To analyze and point out results of experimental data
PC1443-Practicals- Electricity and Magnetism	<p>Objectives This course aimed to impart knowledge and skill for students through setting up and demonstration of various physics experiments from electricity and magnetism</p> <p>Outcome</p> <ul style="list-style-type: none"> To measure and analyze various parameters associated with electric circuits To infer the spatial and temporal variation of magnetic fields To develop experimental skills To analyze and point out results of experimental data To analyze the thermal conductivity of materials
PC1643-Practicals- Optics and Basic Electronics	<p>Objectives This course aimed to impart knowledge and skill for students through setting up and demonstration of various physics experiments from optics and basic electronics</p> <p>Outcome</p> <ul style="list-style-type: none"> To design and construct various electronic circuits and its validation To measure optical parameters using methods and setups using liquid lens , Newton's rings, air wedge and spectrometer To design and construct rectifier circuits To analyze diode and Zener diode characteristics
PC1644-Practicals- Electronics and Computer Science	<p>Objectives This course aimed to impart knowledge and skill for students through setting up and demonstration of various physics experiments from digital electronics and computer science</p> <ul style="list-style-type: none"> To design and construct various digital electronics circuits such as logic gates its validation. To design and construct multi vibrators,

operational amplifiers, adder and subtractor circuits

- To analyze LCR circuit
- To design and develop computer program using programming languages such as C++ to do numerical analysis

GOVERNMENT COLLEGE KARIAVATTOM

DEPARTMENT OF PHYSICS

PROGRAMME AND COURSE OUTCOME

1. Programme Offered: M. Sc. Physics

1.a Objectives

Objectives of the M. Sc Physics program of University of Kerala is to equip the students for pursuing higher studies and employment in any branches of Physics and related areas. The program also envisages developing thorough and in-depth knowledge in Mathematical Physics, Classical Mechanics, Quantum Mechanics, Statistical Physics, Electromagnetic Theory, Nuclear Physics, Atomic and Molecular Spectroscopy and Electronics. The program also aims to enhance problem solving skills of students so that they will be well equipped to tackle national level competitive exams. The program also acts as a bridge between theoretical knowhow and its implementation in experimental scenario. The program also introduces the students to the scientific research approach in defining problems, execution through analytical methods and systematic presentation of results keeping in line with the research ethics through M. Sc dissertations.

1.b Program Outcome:

- Define and explain fundamental ideas and mathematical formalism of theoretical and applied physics.
- Identify, classify and extrapolate the physical concepts and related mathematical methods to formulate and solve real physical problems.
- Identify and solve interdisciplinary problems that require simultaneous implementation of concepts from different branches of physics and other related areas.
- To define a research problem, translate ideas into working models, interpret the data collected draw the conclusions and report scientific data in the form of dissertation.
- To disseminate scientific knowledge and scientific temper in the society to contribute towards greater human cause.

2.c Course Outcome:

<p>PH211-Classical Mechanics</p>	<p>Objectives This course is aimed to provide basic and advanced concepts in classical mechanics. The course discusses Lagrangian and Hamiltonian formalisms, central force problems, theory of small oscillations, Hamilton -Jacobi equations, Kepler's problem, Rigid body dynamics and Euler's equations, Concepts of special and general theory of relativity, Non linear dynamical systems and chaos.</p> <p>Outcome</p> <ul style="list-style-type: none">• Students are able to learn the concepts of Lagrangian and Hamiltonian mechanics and use them to solve problems in mechanics. Able to learn concepts of generating functions, Poisson brackets Hamilton Jacobi equations and action angle variables.• To equip the students to deal with central force problem and analyzing Kepler's laws.• To inculcate the students the concepts of special and general theory of relativity and related problems.• To acquaint the students about the theory of small oscillations and Euler's equations of motions of rigid bodies.• To analyze nonlinear dynamical systems and to explain the concepts of classical chaos.
<p>PH212-Mathematical Physics</p>	<p>Objectives This is course is aimed to equip the students with the mathematical techniques used for developing strong back ground in the basic and advanced level mathematical problems. The course describes about curvilinear coordinates, Fourier series and transforms, probability distributions, partial differential equations and different integral transforms, special functions, tensors and group theory.</p> <p>Outcome</p> <ul style="list-style-type: none">• To apply and analyze the various vector and matrix operations and to perform complex analysis for solving physical problems.• To demonstrate and utilize the concepts of Fourier series and its transforms.

	<ul style="list-style-type: none"> • To explain and differentiate different probabilistic distributions. • To apply partial differential equations and special functions for solving mathematical problems. • To illustrate and apply concepts of group theoretical operations and tensors.
<p>PH213-Basic Electronics</p>	<p>Objectives This course is aimed to introduce the students with the basic knowledge of analog and digital circuits. The course illustrates the concepts of various amplifier circuits, solid state electronic devices, sequential digital circuits, optoelectronics devices and measurements using electronic instruments.</p> <p>Outcome</p> <ul style="list-style-type: none"> • To equip the students design and analyze different analogue and digital circuits. • To summarize the knowledge of basic arithmetic and data processing circuits and memory devices. • To equip the students to explain various components in optical communications systems and microwave devices. • To measure and analyze the different electronic signals.
<p>PH221-Modern Optics and Electromagnetic Theory</p>	<p>Objectives This course covers linear and non-linear optical phenomenon, propagation of electromagnetic waves, relativistic electrodynamics, radiation and antenna theory.</p> <p>Outcome</p> <ul style="list-style-type: none"> • To demonstrate the linear and nonlinear optical phenomena. • To explain and discuss propagation of electromagnetic waves through different media. • To restate formulations and relativistic effects in electrodynamics. • To analyse the propagation of

	<p>electromagnetic waves through waveguides.</p> <ul style="list-style-type: none"> • To use radiation theory in developing different antennas.
<p>PH222- Thermodynamics, Statistical Physics and Basic Quantum Mechanics</p>	<p>Objectives This course is aimed to introduce the concepts of thermodynamic equations, foundations of classical and quantum statistics, theory of phase transitions and foundations quantum mechanics together with problems.</p> <p>Outcome</p> <ul style="list-style-type: none"> • To explain the basic thermodynamic relations, Maxwell's equations and its consequences. • To equip the students to demonstrate and apply classical and quantum statistics in different physical phenomena. • To distinguish the different phase transitions using Ising model. • Outline and apply foundations of quantum mechanics.
<p>PH223-Computer Science and Numerical Techniques</p>	<p>Objectives This course provides introduction to computer architecture, microprocessors, programming in python and C++ and computational numerical methods.</p> <p>Outcome</p> <ul style="list-style-type: none"> • To summarize computer hardware and its operating systems • Explain internal architecture of microprocessors 8085 and create assembly language programming. • To develop and compile programs in python and C++. • Apply numerical methods to solve physical problems.
<p>PH231-Advanced Quantum Mechanics</p>	<p>Objectives This course describes a thorough conceptual understanding of advanced quantum mechanics covering variation method, WKB approximation, perturbation theory, symmetry and conservation laws, theory of scattering, system of identical particles, angular</p>

	<p>momentum and relativistic quantum mechanics..</p> <p>Outcome</p> <ul style="list-style-type: none"> • To extend the use of approximation methods viz variation, WKB, time dependent and time independent perturbations. • To summarize different types of symmetry, conservation laws and quantum theory of scattering. • To distinguish different approximation methods, to study the structure and properties of many electron systems. • To compute eigen values of angular momentum and evaluation of CG coefficients. • Infer the requirements of relativistic quantum mechanics.
<p>PH232-Atomic and Molecular Spectroscopy</p>	<p>Objectives This course provides an overview of symmetry of molecules, concepts of atomic spectra, Photoelectron and photo acoustic spectroscopy, Rotational, vibrational, electronic, Raman, Mossbauer, nuclear and electron spin resonance spectroscopic techniques.</p> <p>Outcome</p> <ul style="list-style-type: none"> • Explain different symmetry operations and deduction of molecular structure. • Distinguish and classify the different spectra shown by atoms and molecules • Illustrate the various spectroscopic experimental techniques.
<p>PH233E-Advanced Electronics -I</p>	<p>Objectives To impart knowledge in advanced digital and analog communications systems and familiarize the concepts of digital signal processing.</p> <p>Outcome</p> <ul style="list-style-type: none"> • To summarize various techniques of digital and analog communication systems. • Generalize the idea of information theory • Illustrate various techniques for digital signal

	processing based Fourier and Z transform.
PH233M-Materials Science -I	<p>Objectives To understand and familiarize fundamentals of materials, structure and its imperfections, growth techniques and associated nucleation theories.</p> <p>Outcome</p> <ul style="list-style-type: none"> • To identify and distinguish various crystal structures and the associated imperfections. • To prepare and demonstrate the synthesis of crystalline materials by different growth techniques. • To demonstrate different methods for growth of thin films. • To discuss various nucleation theories of film growth and analyze the synthesized thin films.
PH233N-Advanced Nuclear Physics	<p>Objectives To understand fundamentals of nuclear structure and models, nuclear reactors, nuclear detectors and accelerators. To describe various types nuclear reactions and theory of elementary particles.</p> <p>Outcome</p> <ul style="list-style-type: none"> • To outline and analyze nuclear properties, structure, models and reactions. • To illustrate the mechanisms of nuclear fission and fusion. • Explain various nuclear detectors and particle accelerators. • To differentiate elementary particles and discuss their interactions
PH233S-Space Physics and Plasma Physics	<p>Objectives To explore the different physical processes that occurs in space environment. The course will provide information about basic plasma phenomena, magnetohydrodynamics, solar physics, cosmic rays and solar energetic particles, physics of atmospheric layers and experimental techniques.</p> <p>Outcome</p> <ul style="list-style-type: none"> • Explain fundamental properties of plasma and plasma waves.

	<ul style="list-style-type: none"> • Apply basic electromagnetism to derive the kinetic theory of plasmas. • Discuss Sun's interior structure and interpret the physics of solar activity. • Discuss the experimental technique for atmospheric studies.
<p>PH233T- Theoretical Physics-I</p>	<p>Objectives To familiarize with the concepts of advanced theoretical physics covering relativistic quantum mechanics, quantum field theory, stochastic processes and general theory of relativity.</p> <p>Outcome</p> <ul style="list-style-type: none"> • To discuss introductory level problems in relativistic quantum mechanics and field theory. • To describe the basic theory of Stochastic processes with emphasize on non-equilibrium systems. • To illustrate formalism of general theory of relativity.
<p>PH241-Condensed Matter Physics</p>	<p>Objectives To understand and familiarize fundamentals of crystals, lattice vibrations, band theory, dielectric, magnetic and superconducting properties of materials. To introduce the synthesis and characterization techniques of nanomaterials.</p> <p>Outcome</p> <ul style="list-style-type: none"> • Discuss crystal physics, lattice vibrations, models of thermal properties and band theory of solids. • Explain the theoretical concepts of semiconductors, dielectric, magnetic and superconducting materials. • To describe the synthesis and characterization techniques of nanomaterials. • To apply the concepts in condensed matter physics to meet the challenges.

<p>PH242-Nuclear And Particle Physics</p>	<p>Objectives To familiarize the fundamental properties of nucleus, its structure, models, nuclear reactions, nuclear detectors and accelerators. To introduce the concept of elementary particles and their interactions.</p> <p>Outcome</p> <ul style="list-style-type: none"> • To describe and analyze nuclear structure, models and reactions. • To illustrate the mechanisms of nuclear fission and fusion reactions. (iii)Discuss various nuclear detectors and particle accelerators. • (iv) To classify elementary particles and discuss their interactions.
<p>PH243E-Advanced Electronics-II</p>	<p>Objectives The course introduces microprocessors and interfacing devices, embedded systems, artificial intelligence and neural networks. It also provides fundamental data communication codes, RADAR and Satellite communications.</p> <p>Outcome</p> <ul style="list-style-type: none"> • Demonstrate microprocessor architecture, programing and interfacing devices. • Outline the basic concepts of embedded systems, artificial intelligence and neural networks. • Illustrate fundamental data communications codes, radar and satellite communication systems.
<p>PH243M-Material Science - II</p>	<p>Objectives This course introduces optical and thermal properties of materials, synthesis of nano structured materials, its characterization and applications. It also gives elements of nanoelectronics and its applications.</p> <p>Outcome</p> <ul style="list-style-type: none"> • Discuss optical and thermal properties of materials. • Explain fundamentals of nanostructured

	<p>materials, synthesis and various characterization techniques.</p> <ul style="list-style-type: none"> • Discuss basic ideas and applications of nanoelectronics.
<p>PH243N-Radiation Physics</p>	<p>Objectives The course covers the interaction of radiation with matter, radioactivity, its detection, its measurement and radiation exposure and biological effects of radiation.</p> <p>Outcome</p> <ul style="list-style-type: none"> • To discuss sources of radiation, its interaction with matter and its measurement. • To illustrate radioactive decay and various measurements techniques used. • To list and discuss biological effects of radiation.
<p>PH243S Advanced Astrophysics</p>	<p>Objectives This course describes general features of observational astronomy, ideas of stellar evolution, galactic physics and elements of cosmology.</p> <p>Outcome</p> <ul style="list-style-type: none"> • Explain general features of observational astronomy. • Describe the formation of stars and stellar structure. • Explain origin of various galaxies.
<p>PH243T-Theoretical Physics - II</p>	<p>Objectives To familiarize with the concepts of advanced theoretical physics covering functional and path integrals in quantum mechanics, theory of many particle systems and critical phenomenon.</p> <p>Outcome</p> <ul style="list-style-type: none"> • Describe functional and path integrals in quantum mechanics. • Discuss theory of many particle systems and critical phenomenon.

<p>PH251-General Physics Practical</p>	<p>Objectives Demonstrate and understand various general physics experiments for acquiring fundamental concepts.</p> <p>Outcome</p> <ul style="list-style-type: none"> • To measure and analyze various physical quantities. • To calculate error in various general physics experiments. • To develop experimental skills
<p>PH252-Electronics and Computer Science Practical</p>	<p>Objectives Design, construct and verify various electronics circuits and object oriented programming using C++ to solve numerical problems.</p> <p>Outcome</p> <ul style="list-style-type: none"> • To design and construct various electronic circuits and its validation. • To calculate error in various electronics experiments. • To develop experimental and programming skills
<p>PH261- Advanced Physics Practical</p>	<p>Objectives Demonstrate and understand various advanced physics experiments for acquiring fundamental concepts and analyze various experimental data.</p> <p>Outcome</p> <ul style="list-style-type: none"> • To measure and analyze various physical quantities. • To calculate error in various advanced physics experiments. • To develop experimental skills To analyze and point out results of experimental data.
<p>PH262E- Advanced Electronics Practical</p>	<p>Objectives Design, construct and study various electronics circuits and programming using microprocessor.</p> <p>Outcome</p> <ul style="list-style-type: none"> • To design and construct various electronic circuits and its validation. • To calculate error in various electronics experiments.

	<ul style="list-style-type: none"><li data-bbox="678 184 1273 260">• To develop and test assembly language programs using microprocessors
--	---

DEPARTMENT OF STATISTICS

Programme Offered: B. Sc. Statistics

Program Outcome:

After completion of the degree apart from his/her specialty in the program of his/her choice the student learns a lot during their three year stay that makes them mature enough to take the right decisions at the right time. Students develop analytical thinking and good communication skills during classroom teaching (through projects/presentation/practical) and also as they participate in various activities both at departmental as well as college level.

As part of various activities in college like seminars and workshops he learns to respect and protect the environment. These programs also help in generating building of ethical values to become a responsible citizen when he/she graduates from the college.

Course Specific Outcome:

Statistics is the language of the uncertainties arised in modern information age. This program is a compact combination of detailed courses of Statistics and adequate amount of courses on Computer Science and Mathematics to complement. The program provide a platform for pursuing higher studies leading to post-graduate or doctorate degrees. Along with this students are equipped with skill enhancement courses like Research methodology, Statistical packages and R language. This enhances theoretical rigor with technical skills which prepare students to become globally competitive to enter into a promising professional life even after graduation. This program offers a range of traditional avenues in academics, Govt. Service, IAS, Indian Statistical/ Economic Services, Industries, Commerce, Investment Banking, Banks and Insurance Sectors, CSO and NSSO, Research Personnel/Investigator in Govt. organizations such as NCAER, IAMR, ICMR, Statistical and Economic Bureau & various PSUs., Market Research, Actuarial Sciences, Biostatistics, Demography etc. It also provides an array of non-traditional employment avenues ranging from Stock Brokers Analyst, Sports Analyst, Poll Analyst, Business Analyst, Financial Analyst, Content Analyst etc.

Courses	Outcomes
ST:1141 Statistical Methods I	Concepts of statistical population and sample, variables and attributes. Tabular and graphical representation of data based on variables. 'Conditions for the consistency' and criteria for the independence of data based on attributes. Measures of central tendency, Dispersion, Skewness and Kurtosis. Moments and their use in studying various characteristics of data
ST:1241 Statistical Methods II	Concept of correlation, various correlation coefficients- Pearson's correlation coefficient, Spearman's rank correlation coefficient, partial correlation coefficient and Multiple correlation coefficient. Concept of Principle of least squares for curve fitting and regression lines.
ST:1341 Probability and Distribution-I	Basic properties of the field of real numbers, the knowledge of the series of real numbers and convergence, Bolzano- Weirstrass theorem, Cauchy criteria Different approaches to the theory of probability. Important

	theorems on probability and their use in solving problem
ST:1441 Probability and Distribution-II	
ST:1541 Probability and Distribution-III	The knowledge of real functions-limits of functions and their properties, notion of continuous functions and their properties and the differentiability of real functions and related theorems To understand the concept of sampling distributions and their applications in statistical inference theoretical concepts of Bivariate Normal and Multinomial distribution along with their properties
ST:1542 Estimation	Drawing conclusions about the whole population on the basis of a sample Various method of estimation along with order statistics
ST:1543 Testing of Hypothesis	To understand the process of hypothesis testing and its significance To derive the most powerful test
ST:1544 Sample Survey Methods	Basic concepts of survey sampling Principles of survey sampling and main steps involved in selecting a sample Simple random sampling Stratified random sampling Systematic sampling Ratio and Regression method of estimation
ST:1551 Open Course 1	Gives an opportunity to other department students to learn and practice statistics as a part of research methodology
ST:1641 Design of Experiments and Vital Statistics	The fundamental concepts of design of experiments. Introduction to planning valid and economical experiments within given resources. Completely randomized design. Randomized block design. Latin square design
ST:1642 Applied Statistics	give exposure to four applied fields of statistics viz. Time Series, Index Numbers
ST:1643 Operation Research and Statistical Quality Control	Formulate and solve LPP, Assignment problems, Transportation problems Different types of control chart
ST:1661.5 Stochastic process	The fundamental concepts of stochastic processes Tools needed to analyze stochastic processes Markov chains and its Stability Poisson process and its variations Branching process Time series
Statistical Data Analysis Using R Practical	Practices of data analysis and graphical interpretation using 'R'. .