B. K. Birla College of Arts, Science & Commerce, Kalyan

Empowered Autonomous Status (2023-2032)

CO, PO, PSO (SCIENCE)

B. K. Birla College of Arts, Science & Commerce, Kalyan

Empowered Autonomous Status (2023-2032)

Bachelor in Information Technology

Programme Outcome (B. Sc)

A student completing bachelor's degree in commerce will be able to:

PO	PO Description A student completing graduation in Science (B.Sc.) will be able to:
PO1	**Scientific Knowledge and its application:** Understand principles and processes underlying various natural phenomenon and application of chosen subject in various technological fields.
PO2	**Problem solving and critical thinking:** Identify and analyse the complex subject related problems leading to the most appropriate solutions using theoretical principles. To apply scientific principles to unknown or real- life situation
PO3	**Innovative ability:** Contemplate and think creatively, evolve innovative approach, promote 'out of the box' thinking and novel approaches. Demonstrate proficiency in sciences and develop scientific temper
PO4	**Ethics**: Demonstrate professional and ethical attitude with responsibility to serve the society and contribute to Nation building.
PO5	**Interpersonal and Communication Skills:** Develop various soft skills to deliver effectively as an individual and as a member or leader in diverse teams or in multidisciplinary settings
PO6	**Progression to higher education:** Acquire eligibility for higher studies in various interdisciplinary courses
PO7	**Environment and Sustainability:** Inculcate environment awareness and strive for sustainable development approach in the chosen field of career
PO8	**Life-long Learning**: Recognize the need and develop ability to be lifelong learner in the broadest context of Subject or beyond, via Online platforms.
PO9	**Positive Attitude:** Realize the potential of every failure to teach a valuable life lesson for success in personal and professional life and become a good human being.

Program Specific Outcome of B. Sc.

A student completing bachelor's degree in science will be able to:

PSO 1	To demonstrate logical and analytical thinking abilities.
PSO 2	Apply the knowledge of ethical and management principles required to work in a team.
PSO 3	To imbibe quality software development practices.

PSO 4	Design, develop and test software systems for world-wide network of computers to provide solutions.
PSO 5	Use the techniques, skills, and modern computing tools to emerge as a freelancer and entrepreneur in the field.
PSO 6	Prepare for various types of Competitive Examinations.
PSO 7	To identify information technology related real life problems and develop or design the system providing solution for the problem.
PSO 8	Identify, analyze complex problems in the real world and formulate innovative solutions.

Course Outcome (B. Sc.)

Course Code	Title of Course	Course Outcome
BUSIT101	**Introduction to C++**	**CO 1:** To learn the fundamental programming concepts and methodologies which are essential to building good C/C++ programs. **CO 2:** Create and analyse algorithms for solving simple problems. **CO 3:** To practice the fundamental programming methodologies in the C/C++ programming language. **CO 4:** Use an IDE to compile, load, save, and debug a C++ program. **CO 5:** To write reusable modules (collections of functions).
BUSIT102	**Digital Electronics**	**CO 1:** Understand the concepts and techniques used in digital electronics. **CO 2:** To acquire basic knowledge for the conversion of different type of codes and number systems, which are used in digital communication and computer system. **CO 3:** Analyse different types of digital electronic circuit using various mapping and logical tools. **CO 4:** Enable students to develop skill to build digital circuits using Simulators. **CO 5:** Understand, analyse, design, and implement combinational and sequential logic circuits.

BUSIT103	**Data Communication and Networking**	**CO 1:** To understand the basic concepts of data communication, layered model, protocols, and inter- working between computer networks and switching components in telecommunication systems. **CO 2:** Understand how errors detected and corrected that occur in transmission. **CO 3:** How collisions to be handled when many stations share a single channel. **CO 4:** Know about routing mechanisms and different routing protocols. **CO 5:** Understand transport layer functions. Know about different application layer protocols. **CO 6:** Conversant with primitives of network application programming.
BUSIT104	**Discrete Mathematics**	**CO 1:** Be able to construct easy mathematical proofs and retain the ability to verify them. **CO 2:** Understand the basic principles of sets and operations in sets. **CO 3:** Demonstrate an understanding of relations and functions and be able to determine their properties. **CO 4:** Demonstrate different traversal methods for trees and graphs. **CO 5:** Be skilful in expressing mathematical properties formally via the formal language of propositional logic and predicate logic. **CO 6:** Model problems in Computer Science using graphs and trees.
BUSIT105	**Communication Skills**	**CO 1:** Understand and apply knowledge of human communication and language processes as they occur across various contexts. **CO 2:** Explain major theoretical frameworks, constructs, and concepts for the study of communication and language. **CO 3:** To put in use the basic mechanics of Grammar. **CO 4:** To provide an outline to effective Organizational Communication. **CO 5:** To stimulate their Critical thinking by designing and developing clean and lucid writing skills.

		CO 6: To demonstrate his verbal and non-verbal communication ability through presentations.
Semester II		
BUSIT201	**Python Programming**	**CO 1:** To introduce and aware learners about preparation of final accounts as per schedule III of Companies Act, 2013. **CO 2:** To develop understanding of learners with accounting treatment in case of Internal Reconstruction, Buyback of Shares, Investment Accounting, and importance of code of professional conduct for accountants **CO 3:** To introduce the concept of Ind-AS.
BUSIT203	**Web Programming**	**CO 1:** Understand Internet and Web Programming basic concepts. **CO 2:** Understand the front end and back-end Web Applications **CO 3:** Understand the latest web programming tools and techniques. **CO 4:** Developing static and dynamic Web Applications. **CO 5:** Integrating and blending latest web technologies for creating Web Applications **CO 6:** Students will utilize coding and software tools to analyse and present data in a professional manner. **CO 7:** To aware the learners with preparation of statement of total cost and understand the procedure for reconciliation between financial accounting and cost accounting results.
BUSIT205	**Database Management System with Oracle**	**CO 1:** Understand basic database concepts, including the structure and operation of the relational data model. **CO 2:** Apply logical database design principles, including E-R diagrams and database normalization. **CO 3:** Enhance the knowledge and understanding of Database analysis and design. **CO 4:** Construct simple database queries using Oracle.
BUSIT204	**Numerical and Statistical Methods**	**CO 1:** Understand the different approaches dispensing the data using theory of probability.

		CO 2: Analyse the different samples of data at distinct level of importance using various hypothesis testing. **CO 3:** Develop a basis for estimating and predicting the distinct sample of data for handling the ambiguities. **CO 4:** Understand error, origin of error and its impact on any computation and evaluating the efficiency of any numerical algorithm. **CO 5:** Obtain numerical solution of nonlinear equations using various iteration methods. **CO 6:** Solve system of linear equations numerically using direct and iterative methods.
BUSIT202	**Microprocessor Architecture**	**CO 1:** To study microprocessor assembly language. **CO 2:** Write assembly language program for microcontrollers. **CO 3:** To take overview of multi core Architectures. **CO 4:** Draw and describe architecture of 8085 microcontroller.
Semester III		
BUSIT311	**OOP using Java**	**CO 1:** Able to apply object-oriented programming features and concepts for solving given problem. **CO 2:** Gain knowledge about basic Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methods etc. **CO 3:** Understand the fundamentals of object-oriented programming in Java, including defining classes, objects, invoking methods etc. and exception handling mechanisms. **CO 4:** Understand the principles of inheritance, packages, and interfaces. **CO 5:** Handle Multiple Exceptions.
BUSIT313	**Modern Operating Systems**	**CO 1:** Analyse the structure and functions of operating systems. **CO 2:** Analyse the structure and functions of operating systems.

		CO 3: Understand the Mutual exclusion and Deadlock detection. **CO 4:** Understand benefits of cloud and virtualization. Understand differences of three types of computing: multiprocessor, multicomputer and distributed systems. **CO 5:** Comparison of three types of computing: multiprocessor, multicomputer and distributed systems. **CO 6:** How to use Linux Operating system.
BUSIT314	**Computer Oriented Statistical Techniques**	**CO 1**: Learn to apply the concepts of probability and distributions. **CO 2:** To gain insight into consequences of plan by probability techniques and processing samples using sampling techniques. **CO 3:** Drawing valid conclusion using estimation theory and proper decision using decision theory. **CO 4:** To learn techniques to correlate the relationship between various variables. **CO 5:** Demonstrate the concepts of numerical methods used for different applications.
BUSIT315	**Mobile App Development using Android**	**CO 1:** To write simple GUI applications. **CO 2:** Use built-in widgets and components. **CO 3**: Work with the database to store data locally, and much more. **CO 4:** Demonstrate their ability to develop software using J2ME. **CO 5:** Demonstrate their ability to deploy software to mobile devices. **CO 6:** Demonstrate their ability to debug programs running on mobile devices.
BUSIT312	**Data Structures**	**CO 1**: To demonstrate proficiency in verifying the correctness of algorithms and understanding of the algorithm. **CO 2**: To analyze and determine the time complexity of algorithms. **CO 3**: To gain familiarity with various sorting algorithms, considering their

		performance characteristics such as running time, stability, and space usage. **CO 4:** To demonstrate the ability to trace their operations in problem-solving contexts, including sorting, searching, selection, operations on numbers, polynomials and matrices, and graphs. **CO 5:** Apply design techniques introduced in the course, such as dynamic programming and greedy algorithms, to devise solutions for complex problems.
Semester IV		
BUSIT402	**Embedded Systems**	**CO 1:** To have knowledge about the basic working of a microcontroller system and its programming in assembly language. **CO 2:** To provide experience to integrate hardware and software for microcontroller applications systems. To Understand microcontroller, microcomputer, and embedded system. **CO 3:** Become familiar with programming environment used to develop embedded systems. **CO 4:** Understand key concepts of embedded systems like IO, timers, interrupts, interaction with peripheral devices.
BUSIT405	**Computer Graphics and Animation**	**CO 1:** To familiarize students with basic principles and techniques for computer graphics. **CO 2:** To Provide knowledge of interactive computer graphics with techniques of clipping, three-dimensional graphics, and three-dimensional transformations. **CO 3:** To gain in-depth learning of various concepts and features such as: 2D viewing, 3D viewing, perspective, lighting, and geometry. **CO 4:** To Provide knowledge of computer graphics system, design algorithms and two-Dimensional Transformation. **CO 5:** Render projected objects to naturalize the scene in 2D view and use of illumination models for this.

		CO 6: To know basic Animation principles to design animated content.
BUSIT401	**Advanced Java**	**CO 1:** Identify advance concepts of java programming with database connectivity. **CO 2:** Design and develop platform independent applications using a variety of component-based frameworks. **CO 3:** Able to implement the concepts of Hibernate, XML& EJB for building enterprise applications. **CO 4:** To equip the students with the advanced feature of modern java, which would enable them to handle complex programs relating to managing data and processes over the network. **CO 5:** Student will be able to develop web application using Java Servlet and Java Server Pages technology.
BUSIT404	**Software Engineering**	**CO 1:** Knowledge of basic SW engineering methods and practices, and their appropriate application. **CO 2:** Describe software engineering layered technology and Process framework. **CO 3:** A general understanding of software process models such as the waterfall and evolutionary models. **CO 4**: Understanding of software requirements and the SRS documents. **CO 3:** Understanding of the role of project management including planning, scheduling, risk management, etc. **CO 4:** Describe data models, object models, context models and behavioural models.
Semester V		
BUSIT501	**Software Quality Assurance**	**CO 1:** Design and implement Test Plans and Procedures. **CO 2:** Apply a wide variety of testing techniques at various testing levels. **CO 3:** Use test tools to effectively test software. **CO 4:** Compute and use various testing metrics. **CO 5:** Students can compute test coverage and yield, according to a variety of criteria.

BUSIT502	**Internet of Things**	**CO 1:** Understand the application areas of IoT, build IoT applications. **CO 2:** Understand the concept of IoT. **CO 3:** Thinking and analyse Prototyping; Able to realize the revolution of Internet in Sensor Networks. **CO 4:** Understand the Communications done through internet. **CO 5:** Design and program IoT devices.
BUSIT503	**ASP.Net with C#**	**CO 1:** Understanding .Net framework, design dynamic web applications using C#. **CO 2:** Define the structure and fundamental concept of Asp.net. **CO 3:** Design forms using IDE and Code behind. **CO 4:** Design, create, build, and debug Asp.net. **CO 5:** Apply data base connectivity and access the fields of the database.
BUSIT505	**Next Generation Technologies**	**CO 1:** To study the basic technologies that forms the foundations of Big Data. **CO 2:** Get an understanding of NoSQL databases, design goals, requirement of NoSQL database/ MongoDB. **CO 3:** Understanding of the basics of how MongoDB stores data. **CO 4:** MongoDB® architecture. **CO 5:** Introduction to JSON and BSON. **CO 6:** Programming using jQuery and its plugins.
Semester VI		
BUSIT602	**Security in Computing**	**CO 1:** Understanding cryptography, various security policies and protocols. **CO 2:** Analyse and evaluate the cyber security needs of an organization. **CO 3:** Determine and analyse software vulnerabilities and security solutions to reduce the risk of exploitation. **CO 4:** To learn about how to maintain the Confidentiality, Integrity, and Availability of a data.

		CO 5: To understand various protocols for network security to protect against the threats in the networks.
BUSIT603	**Business Intelligence**	**CO 1:** Understanding the framework of computerized decision support systems, data analytics. **CO 2:** Introduces the need for computerized support for managerial decision making. **CO 3:** Define the role of data warehouse in decision support and role of methodologies in BPM. **CO 4:** Emphasizes the concept of the process of carrying out a text mining. **CO 5:** Introduce the needs for connecting BI system with other information systems.
BUSIT601	**Linux Administration**	**CO 1:** Make appropriate decisions during the configuration process to create a properly functioning Linux environment. **CO 2:** Use programs and utilities to administer a Linux machine. **CO 3:** Explain how a Linux server can be integrated within a multi-platform environment. **CO 4:** Understand the basic set of commands and editors in Linux Operating System. **CO 5:** Discuss shell programming in Linux operating system. **CO 6:** Demonstrate the role and responsibilities of a Linux system administrator.
BUSIT604	**Principles of Geographic Information Systems**	**CO 1:** Explore mapped data. **CO 2:** Relate GIS with remote sensing technologies. **CO 3:** Analyse spatial data, using GIS analysis tools. **CO 4:** Develop and manage geodatabase. **CO 5:** Functions of geographic information systems.

Empowered Autonomous Status (2023-2032)

Bachelor in Computer Science

Course Code	Title of Course	Course Outcome
After successful completion of each course, learner will be able to -		
Semester I		
BUSCS101	**Digital Systems & Architecture**	**CO1:** To learn about how computer systems work and underlying principles. **CO2:** To understand the basics of digital electronics needed for computers. **CO3:** To understand the basics of instruction set architecture for reduced and complex instruction sets. **CO4:** To understand the basics of processor structure and operation. **CO5:** To understand how data is transferred between the processor and I/O devices.
BUSCS102	**Introduction to Programming with Python**	**CO1:** To understand the concept of Material Cost, Stock Valuation, Labour Costs and Overheads calculation. Ability to store, manipulate and access data in Python. **CO2:** Ability to store, manipulate and access data in Python. **CO3:** Ability to implement basic Input / Output operations in Python. **CO4:** Ability to define the structure and components of a Python program. **CO5:** Ability to learn how to write loops and decision statements in Python. **CO6:** Ability to learn how to write functions and pass arguments in Python. **CO7:** Ability to create and use Compound data types in Python.
BUSCS103	**LINUX Operating System**	**CO1:** Work with Linux file system structure, Linux Environment. **CO2:** Handle shell commands for scripting, with features of regular expressions, redirections. **CO 3:** Implement file security permissions. **CO 4:** Work with vi, sed and awk editors for shell scripting using various control structures. **CO 5:** Install software like compilers and develop programs in C and Python programming languages on Linux Platform. **CO 6:** Acquire practical skills for calculation of different measures of central tendencies.
BUSCS104	**Open-Source Technologies**	**CO1:** Differentiate between Open Source and Proprietary software and Licensing.

		CO2: Recognize the applications, benefits, and features of Open-Source Technologies. **CO3:** Gain knowledge to start, manage open-source projects.
BUSCS105	**Discrete Mathematics**	**CO1:** Define mathematical structures (relations, functions, graphs) and use them to model real life situations. **CO2:** Understand, construct and solve simple mathematical problems. **CO3:** Solve puzzles based on counting principles. **CO4:** Provide basic knowledge about models of automata theory and the corresponding formal languages. **CO5:** Develop an attitude to solve problems based on graphs and trees, which are widely used in software.
BUSCS106	**Descriptive Statistics**	**CO1:** Study of the basic managerial functions of planning, organizing, staffing, directing and controlling resources to accomplish organizational goals. **CO2:** Distinguish the characteristics and skills of proper management by identifying what successful managers do and how they do it. **CO3:** Analyze the business decisions made by organizations using various tools and techniques to remain competitive. **CO4:** Offer diverse learning opportunities to develop analytical and soft skills.
BUSCS107	**Soft Skills**	**CO1:** Learners will develop skills for Academic and Professional Presentations. **CO2:** Learners will be able to understand Leadership Qualities and Ethics. **CO3**: Ability to understand the importance of stress management in their academic & professional life.

Course Code	Title of Course	Course Outcome
After successful completion of each course, learner will be able to -		
Semester II		
BUSCS201	**Design & Analysis of Algorithms**	**CO1:** Students should be able to understand and evaluate efficiency of the programs that they write based on performance of the algorithms used. **CO2:** Students should be able to appreciate the use of various data structures as per need. **CO3:** To select, decide and apply appropriate design principle by understanding the requirements of any real-life problems.
BUSCS202	**Advanced Python Programming**	**CO1:** Ability to implement OOP concepts in Python including Inheritance and Polymorphism. **CO2:** Ability to work with files and perform operations on it using Python. **CO3:** Ability to implement regular expressions and concept of threads for developing efficient programs. **CO4:** Ability to implement exception handling in Python applications for error handling. **CO5:** Knowledge of working with databases, designing GUI in Python and implementing networking in Python.
BUSCS203	**Introduction to OOPs using C++**	**CO1:** Work with numeric, character and textual data and arrays. **CO2:** Understand the importance of OOP approach over procedural language. **CO3:** Understand how to model classes and relationships using UML. **CO4:** Apply the concepts of OOPS like encapsulation, inheritance, and polymorphism. **CO5:** Handle basic file operations.
BUSCS204	**Database Systems**	**CO1:** To appreciate the importance of database design. **CO2:** Analyze database requirements and determine the entities involved in the system and their relationship to one another. **CO3:** Write simple queries to MySQL related to String, Math's and Date Functions. **CO4:** Create tables and insert/update/delete data, and query data in a relational DBMS using MySQL commands. **CO5:** Understand the normalization and its role in the database design process. **CO6:** Handle data permissions. **CO7:** Create indexes and understand the role of Indexes in optimization search.
BUSCS205	**Calculus**	**CO1:** Develop mathematical skills and enhance the thinking power of learners.

		CO2: Understand mathematical concepts like limit, continuity, derivative, integration of functions, partial derivatives. **CO3:** Appreciate real world applications which use the learned concepts. **CO4:** Skill to formulate a problem through Mathematical modelling and simulation.
BUSCS206	**Statistical Methods**	**CO1:** Calculate probability, conditional probability and independence. **CO2:** Apply the given discrete and continuous distributions whenever necessary. **CO3:** Define null hypothesis, alternative hypothesis, level of significance, test statistic and p value. **CO4:** Perform Test of Hypothesis as well as calculate confidence interval for a population parameter for single sample and two sample cases. **CO5:** Apply non-parametric test whenever necessary. **CO6:** Conduct and interpret one-way and two-way ANOVA.
BUSCS207	**E-Commerce & Digital Marketing**	**CO1:** Understand the core concepts of E-Commerce. **CO2:** Understand the various online payment techniques. **CO3:** Understand the core concepts of digital marketing and the role of digital marketing in business. **CO4:** Apply digital marketing strategies to increase sales and growth of business. **CO5:** Apply digital marketing through different channels and platforms. **CO6:** Understand the significance of Web Analytics and Google Analytics and apply the same.
Semester III		
BUSCS301	**Fundamentals of Algorithm**	**CO1**: Understand the concepts of algorithms for designing good program. **CO2**: Implement algorithms using Python. **CO3**: To understand different algorithm design techniques
BUSCS302	**Core Java**	**CO1:** Object oriented programming concepts using Java. **CO2:** Knowledge of input, its processing and getting suitable output. **CO3:** Understand, design, implement and evaluate classes and applets. **CO4:** Knowledge and implementation of AWT package.

BUSCS303	**Operating System**	**CO1:** To provide a understanding of operating system, its structures and functioning. **CO2:** Develop and master understanding of algorithms used by operating systems for various purposes. **CO3:** Retrieving data. Wait a few seconds and try to cut or copy again.
BUSCS304	**DBMS**	**CO1:** Master concepts of stored procedure and triggers and its use. **CO2:** Learn about using PL/SQL for data management. **CO3:** Understand concepts and implementations of transaction management and crash recovery.
BUSCS305	**Combinatorics and Graph Theory**	**CO1:** Appreciate beauty of combinatorics and how combinatorial problems naturally arise in many settings. **CO2:** Evaluate some real time problems using concepts of graph theory. **CO3:** Understand and explain the basic concepts of graph theory.
BUSCS306	**Web Technology**	**CO1:** Design valid, well-formed, scalable, and meaningful pages using emerging technologies. **CO2:** Understand the various platforms, devices, display resolutions, viewports, and browsers that render websites. **CO3:** Develop and implement client-side and server-side scripting language programs.
Semester IV		
BUSCS401	**Theory of Computation**	**CO1:** Understand Grammar and Languages. **CO2**: Learn about Automata theory and its application in Language Design. **CO3**: Learn about Turing Machines and Pushdown Automata.
BUSCS402	**Advanced Java**	**CO1:** Understand the concepts related to Java Technology. **CO2:** Explore and understand use of Java Server Programming
BUSCS403	**Computer Networks**	**CO1:** Learner will be able to understand the concepts of networking, which are important for them to be known as a ‘networking professionals.

		CO2: Useful to proceed with industrial requirements and international vendor certifications. **CO3:** Analyse a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
BUSCS404	**Software Engineering**	**CO1:** How to apply the software engineering lifecycle by demonstrating competence in communication, planning, analysis, design, construction, and deployment. **CO2:** An ability to work in one or more significant application domains. **CO3:** Work as an individual and as part of a multidisciplinary team to develop and deliver quality software.
BUSCS405	**LAP**	**CO1:** Appreciate the relevance of linear algebra in the field of computer science. **CO2:** Understand the concepts through program implementation. **CO3:** Instil a computational thinking while learning linear algebra.
BUSCS406	**.Net Technologies**	**CO1:** Understand the .NET framework. **CO2:** Develop a proficiency in the C# programming language. **CO3:** Proficiently develop ASP.NET web applications using C#. **CO4:** Use ADO.NET for data persistence in a web application.
BUSCS407	**Android App Development**	**CO1:** Install and configure Android Studio for application development. **CO2:** Master basic to intermediate concepts of Kotlin required for mobile application development. **CO3:** Use built-in widgets and components, work with the database to store data. **CO4:** Master key Android programming concepts and deploy the application on Google Play.

Semester V		
BUSCS501	**Artificial Intelligence**	**CO1:** Understand the concepts of AI algorithms. **CO2:** Implement algorithms using Python.
BUSCS502	**Software Testing and Quality Assurance**	**CO1:** Understand various software testing methods and strategies. **CO2:** Understand a variety of software metrics and identify defects and managing those defects for improvement in quality for given software. **CO3:** Design SQA activities, SQA strategy, formal technical review report for software quality control and assurance.
BUSCS503	**Information And Network Security**	**CO1:** Work with security technical solutions and perform various functions. **CO2:** Understand the importance of security approach by using some operations. **CO3:** Understand how to secure your data and maintain relationship with your client.
BUSCS505	**Game Programming**	**CO1:** Learner should study Graphics and gamming concepts with present working style of developers where everything remains on internet and they need to review it, understand it, be a part of community and learn. **CO2:** Should understand use of DirectX. **CO3:** Should learn the Unity platform for game development.
BUSCS506	**Web Services**	**CO1:** Emphasis on SOAP based web services and associated standards such as WSDL. **CO2:** Design SOAP based / RESTful / Web Services. **CO3:** WCF services Deal with Security and QoS issues of.
Semester VI		
BUSCS606	**Data Science**	**CO1:** The students should be able to understand & comprehend the problem. **CO2:** Able to define suitable statistical method to be adopted. **CO3:** To enable students to design advanced statistical models.

BUSCS601	**Wireless Sensor Networks and Mobile Communication**	**CO1:** Learner should be able to list various applications of wireless sensor. **CO2:** To describe the concepts, protocols, design, implementation. **CO3:** Implement and evaluate new ideas for solving wireless sensor network design issues.
BUSCS603	**Cyber Forensics**	**CO1:** Plan and prepare for all stages of an investigation - detection, initial response, and management interaction, investigate various media to collect evidence. **CO2:** Report them in a way that would be acceptable in the court of law.
BUSCS604	**Digital Image Processing**	**CO1:** Learner should review the fundamental concepts of a digital image processing system. **CO2:** Analyse the images in the frequency domain using various transforms. **CO3:** Evaluate the techniques for image. **CO4:** Apply various compression techniques. They will be familiar with basic image processing techniques for solving real problems.
	Ethical Hacking	**CO1:** To gain knowledge about Ethical hacking and penetration testing. **CO2:** To learn about various types of attacks, attackers and security threats and vulnerabilities present in the computer system. **CO3:** To examine how social engineering can be done by attacker to gain access of useful & sensitive information about the confidential data **CO4:** To learn about cryptography, and basics of web application attacks.

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Empowered Autonomous Status (2023-2032)

Bachelor in Biotechnology

Program Specific Outcome

On completion of the B. Sc. Computer Science programme, students will be able to –

Program Specific Outcome of B. Sc.

A student completing bachelor's degree in science will be able to:

PSO 1	Have adequate theoretical and practical base and understanding of various biological, microbial, and biotechnological processes.
PSO 2	Develop the ability to analyze biological and environmental events.
PSO 3	Effectively and ethically use basic laboratory skills, good laboratory practices, different lab instruments experiments to make meaningful contribution in creation of information and its effective dissemination. .
PSO 4	Articulate their own views, re-examine existing concepts leading to research and finding solutions to pressing environmental and industrial problems.
PSO 5	Develop ethical and social values and be sensitive to the environment, heritage and tradition of their own country and others.
PSO 6	Obtain job opportunities in academia, R&D departments, hospitals, scientific and clinical research institutes, biotechnological industries through exposure to skill-based curriculum.

Course Outcome (B. Sc.)

Semester I

Course Code	Title of Course	Course Outcome
BUSBT101	**Basic Chemistry-I**	**CO 1:** Classify chemical compounds. *{Cognitive level (Bloom's Level)- 1}* **CO 2:** Understand various bonds formation. *{Cognitive level (Bloom's Level)- 1,2}* **CO 3:** Showcase a detailed knowledge of the properties of water, buffers, and acids. *{Cognitive level (Bloom's Level)- 1,3,4}*
BUSBT102	**Biochemistry-I**	**CO 1:** Understand the importance and necessity of carbohydrate as a biomolecule. *{Cognitive level (Bloom's Level)- 1,3}*

		CO 2: Gain knowledge of lipids and their classification. *{Cognitive level (Bloom's Level)- 1,4}* **CO 3:** Understand the importance of Nucleic acids, the genetic material. *{Cognitive level (Bloom's Level)- 1,2,4}*
BUSBT103	**Basic Life Science-I**	**CO 1:** Understand the importance of biodiversity and the various life forms on earth as plants and animal diversity. *{Cognitive level (Bloom's Level)- 1,3}* **CO 2:** Gain knowledge of the microbial diversity and their importance. *{Cognitive level (Bloom's Level)- 1,2,3}* **CO 3:** Understand the basics of the classification of bacteria and their growth kinetics. *{Cognitive level (Bloom's Level)- 1,4}*
BUSBT104	**Basic Life Science-II**	**CO 1:** Understand various sterilization techniques and their uses in biotechnology. *{Cognitive level (Bloom's Level)- 1,3}* **CO 2:** Understand the nutritional requirements of microorganism and cryopreservation techniques. {Cognitive level (Bloom's Level)- 1,4} **CO 3:** Apply and practice the principles and applications of microscopes and various staining techniques. *{Cognitive level (Bloom's Level)- 1, 4, 6}*
BUSBT105	**Biotechnology-I**	**CO 1:** Gain an understanding regarding the importance and scope of biotechnology. *{Cognitive level (Bloom's Level)- 1, 3}* **CO 2:** Understand various applications of biotechnology. *{Cognitive level (Bloom's Level)- 2, 3}* **CO 3:** Showcase knowledge about the various ecosystems and interactions. *{Cognitive level (Bloom's Level)- 1, 2}*
BUSBT106	**Biotechnology-II**	**CO 1:** Understand various mendelian and non mendelian inheritances. *{Cognitive level (Bloom's Level)- 1, 3}*

		CO 2: Understand the eukaryotic genome and various chromosomal disorders. *{Cognitive Level (Bloom's Level)- 1, 3}* **CO 3:** Apply and practice the basics of Biostatistics and its application in biological sciences. *{Cognitive level (Bloom's Level)- 1, 4, 6}*
BUSBT107	**Ability Enhancement Course I-Societal Awareness**	**CO 1:** Attain an overview of the Indian society, the multicultural diversity, and population distribution. *{Cognitive level (Bloom's Level)- 1}* **CO 2:** Understand the concept of disparity in the Indian society. *{Cognitive level (Bloom's level)- 1, 2}* **CO 3:** Gain knowledge about the Indian Constitution. *{Cognitive level (Bloom's Level)- 1, 3}*
Semester II		
BUSBT201	**Basic Chemistry-II**	**CO 1:** Understand the principles of thermodynamics and the Redox chemistry. *{Cognitive level (Bloom's Level)- 1, 4}* **CO 2:** Understand the basics of chemical kinetics and will be able to analyze the order of reactions. *{Cognitive level (Bloom's Level)- 1, 4}* **CO 3:** Perform titrimetric and gravimetric analysis. *{Cognitive level (Bloom's Level)- 1, 3,4}*
BUSBT202	**Biochemistry-II**	**CO 1:** Understand the importance and necessity of amino acids as a biomolecule. *{Cognitive level (Bloom's Level)- 1, 3}* **CO 2:** Identify the types of enzymes and classify them into different groups. *{Cognitive level (Bloom's Level)- 1, 3}* **CO 3:** Understand the different analytical techniques and analyse their applications. *{Cognitive level (Boom's Level)- 1, 3, 4}*
BUSBT203	**Basic Life Science-I**	**CO 1:** Understand the prokaryotic cell organization and division. *{Cognitive level (Bloom's Level)- 1, 2}*

		CO 2: Understand the eukaryotic cell organization and division. *{Cognitive level (Bloom's Level)- 1, 2, 4}* **CO 3:** Identify and classification the different types of viruses. *{Cognitive level (Bloom's Level) - 1, 2, 3}*
BUSBT204	**Basic Life Sciences-II**	**CO 1:** Understand the plant physiology, their hormones and the secondary metabolites. *{Cognitive level (Bloom's Level)- 1, 2, 3}* **CO 2:** Understand the animal physiology and the various process that occur in them. *{Cognitive level (Bloom's Level)- 1, 3}* **CO 3:** Understand the nutrient and biogeochemical cycles and the concept of endangered species. *{Cognitive level (Bloom's Level)- 1, 3}*
BUSBT207	**Ability Enhancement Course II- Globalization, Ecology and Sustainable Development**	**CO 1:** Attain knowledge about Globalization and the Indian society and the concepts of Human rights. *{Cognitive level (Bloom's Level)- 1}* **CO 2:** Understand the concepts of Ecology and sustainable development. *{Cognitive level (Bloom's Level)- 1, 3}* **CO 3:** Manage and tackle stress and conflicts effectively. *{Cognitive level (Bloom's Level)- 1, 2, 3}*
Semester III		
BUSBT301	**Biophysics**	**CO 1:** Understand the different aspects of classical physics. *{Cognitive level (Bloom's Level)- 1}* **CO 2:** Relate to the principles of physics to applications and techniques in the field of biology such as microscopy, spectroscopy, and electrophoresis. *{Cognitive level (Bloom's Level)- 5}*
BUSBT302	**Applied Chemistry I**	**CO 1:** Develop an understanding of the different aspects of organic and green

		chemistry. *{Cognitive level (Bloom's Level)- 1}* **CO 2:** Discuss role of organic compounds in biology and synthesis of organic compounds electrophoresis. *{Cognitive level (Bloom's Level)-4}* **CO 3:** Discuss role of green chemistry and its application in industry. *{Cognitive level (Bloom's Level)- 4}* **CO 4:** Develop an understanding of the different aspects of analytical chemistry. *{Cognitive level (Bloom's Level)- 6}*
	Immunology	**CO 1:** Understand the role of different types of cells, effector molecules and effector mechanisms in immunology. *{Cognitive level (Bloom's Level)- 1}* **CO 2:** Understand the principles underlying various immune techniques. *{Cognitive level (Bloom's Level)- 1,3}* **CO 3:** List the factors playing a role in causing a disease gain. *{Cognitive level (Bloom's Level)- 5}*
	Cell Biology & Cytogenetics	**CO 1:** Gain an understanding of the cytoskeleton and cell membrane. *{Cognitive level (Bloom's Level)- 1}* **CO 2:** Understand the structure of chromosomes and types of chromosomal aberrations. *{Cognitive level (Bloom's Level)- 1}* **CO 3:** Understand the principles underlying sex determination, linkage and mapping. *{Cognitive level (Bloom's Level)- 1,4}*
	Molecular Biology	**CO 1:** Understand the mechanisms associated with gene expression at the level of transcription and translation. *{Cognitive level (Bloom's Level)- 1,2}* **CO 2:** Understand the mechanisms associated with regulation of gene

		expression in prokaryotes and eukaryotes. *{Cognitive level (Bloom's Level)- 1,2}*
	Applied Microbiology	**CO 1:** Understand the different forms of air, soil and water pollutants. *{Cognitive level (Bloom's Level)- 1,2}* **CO 2:** Know different enumeration and treatment methods. *{Cognitive level (Bloom's Level)- 1,3}* **CO 3**Understand the soil ecosystem and different biogeochemical cycles associated with it. *{Cognitive level (Bloom's Level)- 1,2}*
	Food Nutrition, adulteration & preservation	**CO 1:** Learn the concept of nutrition. *{Cognitive level (Bloom's Level)- 1}* **CO 2:** Understand the different food borne diseases. *{Cognitive level (Bloom's Level)- 2}* **CO 3:** Learn the different ways to detect contaminants in food. *{Cognitive level (Bloom's Level)- 3}* **CO 4:** Understand all the different techniques of preserving food. *{Cognitive level (Bloom's Level)- 3}*
Semester IV		
BUSBT401	**Biochemistry**	**CO 1:** Learn the metabolic pathways of carbohydrates, amino acids, lipids and nucleotides *{Cognitive level (Bloom's Level)- 1}* **CO 2: Understand** the role of energy rich molecules in metabolism. *{Cognitive level (Bloom's Level)- 2}*
BUSBT402	**Applied Chemistry II**	**CO 1:** Develop an understanding of the different aspects of analytical chemistry. *{Cognitive level (Bloom's Level)- 1,6}* **CO 2:** Gain an insight of natural product chemistry and related acquired skills. *{Cognitive level (Bloom's Level)- 1}*

		CO 3: Understand the basic concepts in polymer chemistry. *{Cognitive level (Bloom's level)- 1}* **CO 4:** Develop an understanding of the different aspects of analytical chemistry. *{Cognitive level (Bloom's level)- 6}*
BUSBT	**Medical Microbiology**	**CO 1:** Discuss the various aspects of systemic infections including causative agents, symptoms and prophylaxis. *{Cognitive level (Bloom's level)- 1}* **CO 2:** Gain the technical capability of handling, isolating and identifying various bacteria. *{Cognitive level (Bloom's level)- 1,2}* **CO 3:**List the factors playing a role in causing a disease gain. *{Cognitive level (Bloom's level)- 6}*
	Environmental Biotechnology	**CO 1:** Gain an insight of the causes, types and control methods for environmental pollution. *{Cognitive level (Bloom's level)- 1}* **CO 2:** Explore the application of different life forms in environmental remediation. *{Cognitive level (Bloom's level)- 3*
	Bioprocess technology	**CO 1:** Understand principles underlying design of fermenter and fermentation. *{Cognitive level (Bloom's level)- 1}* **CO 2:** Develop skills associated with screening of industrially important strains. *{Cognitive level (Bloom's level)- 5}*
	Applied Biotechnology	**CO 1:** Understand the basic concepts of PTC & ATC. *{Cognitive level (Bloom's level)- 1}* **CO 2:** Explore the various applications of tissue culture technique. *{Cognitive level (Bloom's level)- 3}* **CO 3:** Apply the various statistical tools for analysis of biological data. *{Cognitive level (Bloom's level)- 3}*

	Entrepreneurship Development	**CO 1:** Develop an understanding of the systematic process and to select and screen a business idea. *{Cognitive level (Bloom's level)- 6}* **CO 2:** Design strategies for successful implementation of ideas. *{Cognitive level (Bloom's level)- 5}*
Semester V		
BUSBT501	**Cell Biology**	**CO 1:** Learn cell division & apoptosis in Prokaryotes & Eukaryotes. *{Cognitive level (Bloom's level)- 1}* **CO 2:** Know the cell signalling and its pathways. *{Cognitive level (Bloom's level)- 1}* **CO 3:** Understand the fundamental concepts of Developmental biology. *{Cognitive level (Bloom's level)- 1,2}* **CO 4:** Learn the genetics & treatment of cancer. *{Cognitive level (Bloom's level)- 1,2}*
BUSBT502	**Medical Microbiology and Instrumentation**	**CO 1:** Know about different structure, classification, Life cycle of viruses. *{Cognitive level (Bloom's level)- 1}* **CO 2:** Understand about various drugs and their mode of action, effective for bacterial, fungal & viral infections. *{Cognitive level (Bloom's level)- 1}* **CO 3:** Learn about different spectroscopy techniques. *{Cognitive level (Bloom's level)- 1,3}* **CO 4:** Understand various chromatography techniques, their applications & their use. *{Cognitive level (Bloom's level)- 1,3}*
BUSBT503	**Genomics and Molecular Biology**	**CO 1:** Know the cloning the cloning vectors & enzymes involved in RDT. *{Cognitive level (Bloom's level)- 1}*

		CO 2: Learn about the developing transgenic plants & animals using the vectors & other tools of RDT. *{Cognitive level (Bloom's level)- 1,2}* **CO 3:** Understand the techniques like blotting, cloning involved in RDT. *{Cognitive level (Bloom's level)- 1}* **CO 4:** Understand gene editing, CRISPER etc. *{Cognitive level (Bloom's level)- 3}*
BUSBT504	**Marine Biotechnology**	**CO 1:** Learn about marine organisms & bioprospecting. *{Cognitive level (Bloom's level)- 1}* **CO 2:** Understand the use of marine organisms for isolation of novel enzymes. *{Cognitive level (Bloom's level)- 1}* **CO 3:** Know the use of marine sources as nutraceuticals. *{Cognitive level (Bloom's level)- 1,3}* **CO 4:** Learn the use of marine organisms in cosmetics. *{Cognitive level (Bloom's level)- 3}*
BUSBT505	**Applied component – EVS**	**CO 1:** Learn various approaches for sustainable development. *{Cognitive level (Bloom's level)- 1}* **CO 2:** Know about the impact various events like Bhopal gas tragedy on the environment. *{Cognitive level (Bloom's level)- 1}*
Semester VI		
BUSBT601	**Biochemistry**	**CO 1:** Know the various aspects of protein biochemistry. *{Cognitive level (Bloom's level)- 1}* **CO 2:** Learn the carbohydrate metabolism. *{Cognitive level (Bloom's level)- 1}* **CO 3:** Understand mechanism of various hormones in human males & females. *{Cognitive level (Bloom's level)- 1,2}* **CO 4:** Know role of various essential vitamins & minerals. *{Cognitive level (Bloom's level)- 1,2}*

BUSBT602	**Industrial Microbiology**	**CO 1:** Understand the fundamentals of dairy technology. *{Cognitive level (Bloom's level)- 1}* **CO 2:** Learn downstream processing for various industrially important products. *{Cognitive level (Bloom's level)- 1}* **CO 3:** Know the basics of fermentation technology. *{Cognitive level (Bloom's level)- 1}* **CO 4:** Learn regulations for Good Manufacturing Practices. *{Cognitive level (Bloom's level)- 1,6}*
BUSBT603	**Agri Biotechnology**	**CO 1:** Learn about construction & features of greenhouse technology. *{Cognitive level (Bloom's level)- 1}* **CO 2:** Understand plant stress biology. *{Cognitive level (Bloom's level)- 2}* **CO 3:** Know about molecular markers like RAPD, RFLP, SSR for plant breeding. *{Cognitive level (Bloom's level)- 1,3}* **CO 4:** Learn about different biofertilizers, biopesticide, their mode of action & preparations. *{Cognitive level (Bloom's level)- 1,5}*
BUSBT604	**Environmental biotechnology and bioinformatics**	**CO 1:** Learn about renewable sources of energy. *{Cognitive level (Bloom's level)- 1}* **CO 2:** Understand industrial effluent treatment & wastewater treatment. *{Cognitive level (Bloom's level)- 1}* **CO 3:** Know about biological databases. *{Cognitive level (Bloom's level)- 1}* **CO 4:**Understand the tools in bioinformatics for sequence analysis like BLAST, MSA etc. *{Cognitive level (Bloom's level)- 3}*
BUSBT605	**Applied component – Biosafety**	**CO 1:** Learn about different biosafety lab levels. *{Cognitive level (Bloom's level)- 1}* **CO 2:** Understand Good Lab Practices. *{Cognitive level (Bloom's level)- 2}* **CO 3:** Know about the Detection and testing of contaminants in food products. *{Cognitive level (Bloom's level)- 1,3}* **CO 4:** Learn the concept of biosafety in RDT experiments. *{Cognitive level (Bloom's level)- 1,6}*

B. K. Birla College of Arts, Science & Commerce, Kalyan

Empowered Autonomous Status (2023-2032)

Bachelor in Mathematics

Program Specific Outcome

On completion of the B. Sc. Computer Science programme, students will be able to –

Program Specific Outcome of B. Sc.

A student completing bachelor's degree in science will be able to:

PSO 1	Academic Competence a) Students will be able to formulate and develop mathematical arguments in a logical manner. b) Students will learn the application of mathematics in various fields of science and technology.
PSO 2	Research Competence a) Students can opt for Integrated Ph.D. program in Pure and Applied Mathematics. b) Students will be able to write review articles in research proceedings. c) Students will recognize the need to engage in lifelong learning of mathematics to develop research competency.

Course Outcome (B. Sc.)

Semester I		
Course Code	**Title of Course**	**Course Outcome**
BUSMT101	**Calculus-I**	**CO 1:** To explain the notations of convergent sequence. **CO 2:** To identify the monotonic sequence or not**.** **CO 3:** To write the concept of limits and continuity.
BUSMT102	**Algebra-I**	**CO 1:** To revise basic concepts of integers like divisibility, gcd, lcm, prime numbers, fundamental theorem of arithmetic. **CO 2:** To analyse properties of congruence and their applications, Fermat's theorem, Euler's theorem, Wilson's theorem.

		CO 3: To apply basic concepts of functions such as direct image, inverse image, injective, surjective, bijective, inverse functions, composition of functions.
BUSMT201	**Calculus-II**	**CO 1:** To recall Continuity of real valued functions. **CO 2:** To learn Differentiability of real valued functions and its application. **CO 3:** To examine Series of real numbers.
BUSMT202	**Linear Algebra-I**	**CO 1:** To experiment with the system of linear equations and matrices. **CO 2:** To calculate rank of matrices using various methods. **CO 3:** To solve the system of linear equation using Gaussian elimination method.
BUSMT301	**Calculus-III**	**CO 1:** To identify Riemann Integrable functions. **CO 2:** To analyse applications of integration. **CO 3:** To apply definite integral. **CO 4:** To examine the convergence of improper integrals. **CO 5:** To write β and Γ functions and their properties.
BUSMT302	**Linear Algebra-II**	**CO 1:** To recognise the dimensions of vector spaces. **CO 2:** To realise concept of determinants. **CO 3:** To obey inner product spaces. **CO 4:** To examine properties of inner products.
BUSMT303	**Discrete Mathematics**	**CO 1:** To define permutation function, signature, recurrence relation, countable and uncountable sets. **CO 2:** To examine recurrence relation and examine countable and uncountable sets. **CO 3:** To analyze the properties of permutation functions, Pascal's Identity, Circular Permutation and Stirling numbers.

		CO 4: To investigate Pigeonhole Principle, Binomial Theorem, Inclusion and Exclusion Principle.
BUSMT401	**Calculus-IV**	**CO 1:** To compare properties of functions of several variables with those of functions of one variable. **CO 2:** To calculate directional derivatives and partial derivatives of scalar fields. **CO 3:** To differentiate scalar and vector field. **CO 4:** To examine the continuity of scalar field. **CO 5:** To investigate maxima and minima of a function of two variables.
BUSMT402	**Linear Algebra-III**	**CO 1:** To recall vector spaces, subspaces, basis, dimensions, linear transformation and inner product spaces. **CO 2**To define quotient spaces, eigenvalues, eigenvector, diagonalizable matrix and quadratic forms. **CO 3:** To apply the First Isomorphism Theorem, Cayley Hamilton Theorem and experiment with diagonalization and orthogonal diagonalization. **CO 4:** To examine the properties of orthogonal linear transformation, isometry, eigenvalues, eigenvectors, and positive definite matrix.
BUSMT403	**Ordinary Differential Equation**	**CO 1:** To extract the solution of differential equations of the first order and of the first degree by variables separable, Homogeneous and Non-Homogeneous methods. **CO 2:** To find a solution of differential equations of the first order and of a degree higher than the first by using methods of solvable for p, x and y. **CO 3:** To compute all the solutions of second and higher order linear differential equations with constant coefficients, linear equations with variable coefficients.
Semester V		
BUSMT501	**Multivariable Calculus**	**CO 1:** To define Multiple Integral. **CO 2:** To evaluate Line Integral. **CO 3:** To calculate Surface Integral.

BUSMT502	**Algebra-II**	**CO 1:** To recall basis and dimension of quotient spaces, find orthonormal basis. **CO 2:** To express isometries as composition of orthogonal transformations and translations. **CO 3:** To find eigenvalue and eigenvector of a matrix, understand applications of Cayley Hamilton Theorem.
BUSMT503	**Topology of Metric Spaces**	**CO 1:** To explain each of the metric space properties (M1) – (M3) and be able to verify whether a given distance function is a metric. **CO 2:** To distinguish between open and closed balls in a metric space and be able to determine them for given metric spaces. **CO 3:** To find limit point, Interior and exterior of a set.
BUSMT5A4	**Numerical Analysis I**	**CO 1:** To define transcendental equations, Newton-Raphson method, Secant method, Regula-Falsi method, and their rate of convergence. **CO 2:** To apply Muller method, Chebyshev method, Multipoint iteration method and their rate of convergence. **CO 3:**To examine Doolittle and Crouts method, Cholesky method, Jacobi iteration method, Gauss-Siedal method and convergence analysis.
BUSAC501	**Electronic and Instrumentation-I**	**CO 1:**To use SciLab to define matrices and do matrix operations. **CO 2:**To plot 2D and 3D graphs, write programs to roots of algebraic and transcendental equations. **CO 3:**To write mathematical research papers, articles, and books, insert images in LaTeX.
Semester VI		

BUSMT601	**Basic Complex Analysis**	**CO 1:** To define Complex numbers. **CO 2:** To apply Cauchy Integral Formula. **CO 3:** To evaluate complex power series.
BUSMT602	**Algebra-III**	**CO 1:** To identify normal subgroups, apply Lagrange's Theorem. **CO 2:** To apply Cayley's theorem. **CO 3:** To study and identify rings.
BUSMT603	**Topology of Metric Spaces and Real Analysis**	**CO 1:** To examine given function is continuous or not. **CO 2:** To identify connected sets. **CO 3:** To compare properties of connected sets on $\mathbb{R}$ with an arbitrary metric space.
BUSMT604	**Numerical Analysis II**	**CO 1:** To apply Lagrange's Interpolation formula, Difference operators, Newton's forward and backward interpolating formulae. **CO 2:** To differentiate numerically. To calculate numerical integration using Trapezoidal rule, Simpson's 1/3rd and Simpson's 3/8th rule and their convergence
BUSAC601	**Electronic and Instrumentation-II**	**CO 1:** To use of NumPy and Scripy for solving problems in a linear algebra and calculus, differential equations. **CO 2:** To inculcate knowledge on object-oriented programming concept using C++.

B. K. Birla College of Arts, Science & Commerce, Kalyan

Empowered Autonomous Status (2023-2032)

Bachelor in Physics

Program Specific Outcome

On completion of the B. Sc. Computer Science programme, students will be able to –

Program Specific Outcome of B. Sc.

A student completing bachelor's degree in science will be able to:

PSO 1	Students will learn fundamental principles of Physics and will be able to suggest innovative solutions to problems in Applied Physics.
PSO 2	Students will develop an ability to use contemporary experimental apparatus, analytical tools, and virtual tools.

PSO 3	Students will be able to opt for higher education including interdisciplinary fields and will be able to undertake competitive examinations

. Course Outcome (B. Sc.)

Course Code	Title of Course	Course Outcome
Semester I		
BUSPH101	**Classical Physics**	**CO 1:** Identify various types of mechanical forces and apply mathematical methods to develop force equations for dynamical systems. *{*Bloom's cognitive level- *1-4}*
BUSPH102	**Modern Physics**	**CO 1:** Understand basic properties of Nuclei and estimate energies involved in variety of nuclear reactions. *{*Bloom's cognitive level- *1-4}*
Semester II		
BUSPH201	**Mathematical Physics**	**CO 1:** After completion of the syllabus students will be able to apply mathematical techniques to solve the problems in Physics. **CO 2:** The students would be able to apply differential equations and mathematical techniques to solve electrical circuits
BUSPH202	**Electricity And Electronics**	**CO 1:** Using Network theorems students will be able to analyse and solve complex electrical circuits. **CO 2:** Understanding digital logic and applying it to digital circuits.
Semester III		
BUSPH301	**Theory of Errors and Mechanics**	**CO 1 :** Identify and analyse different types of Errors in Measurements. Develop understanding, solve problems and Estimate Errors in Practical measurements. *{*Bloom's cognitive level- 1,2,*3}* **CO 2:** Develop and analyse theory of Damped and Forced Vibrations. Mathematically formulate the Equations Practical Application. *{*Bloom's cognitive level- 2,*3,4}* **CO 3:**Basic Definitions. Understanding acoustics of a Hall and a Building. Factors

		Affecting Sound Distribution in an Auditorium. Bending of Beams and Applications. *{*Bloom's cognitive level- 1,2,*3}*
BUSPH302	**Analog and Digital Electronics**	**CO 1**: Identify various types of Electronics Circuits of Transistor biasing, Analyse the advantages, and apply them to Practical Circuits. *{*Bloom's cognitive level- 1-5*}* **CO 2:** Explain theorical circuits like Oscillators and Op-Amp based circuits and their applications to design and create their Practical Circuits. *{*Bloom's cognitive level- 1-6*}* **CO 3:** Understanding various types of Number system and solving based Problems. *{*Bloom's cognitive level- 1-4*}*
BUSPH303	**Thermodynamics**	**CO 1:** Identify type of thermodynamic processes, differentiate between heat and temperature. *{*Bloom's cognitive level- 1*}* **CO 2:** Explain working of various types of heat engines, calculate efficiency of heat engines and CoP of refrigerators. *{*Bloom's cognitive level- 2-5*}* **CO 3:** Define entropy, estimate entropy change in various thermodynamic systems, state and explain second law of thermodynamics and third law of thermodynamics. Predict direction of change of entropy, explain temperature scale and absolute zero temperature. *{*Bloom's cognitive level- 2-5*}* **CO 4:** Explain processes to create low temperature. *{*Bloom's cognitive level- 2*}*
Semester IV		
BUSPH401	**Optics**	**CO 1:** Identify different types of diffractions and develop mathematical equations for specific applications related to Experiments. *{*Bloom's cognitive level- 1,3,4*}* **CO 2:** Explain application of Interference, Detailed Analysis of Interferometers, develop understanding of Resolving Power

		of an optical instrument. *{*Bloom's cognitive level- 2,3,4*}* **CO 3:** Produce and analyse various types of polarised lights, Develop Simple Mathematical Formulations, Basic Applications. *{*Bloom's cognitive level- 1,3,4*}*
BUSPH402	**Electromagnetism and Quantum Mechanics**	**CO 1:** Remember fundamental concepts of electromagnetism and apply them to various practical cases. *{*Bloom's cognitive level- 1-4*}* **CO 2:** Identify the mathematical requirements for quantum mechanics. *{*Bloom's cognitive level- 1-3*}* **CO 3:** Apply quantum mechanical problems to well established cases of potentials. *{*Bloom's cognitive level- 4*}*
BUSPH403	**Applied Physics**	**CO 1:** Students will be able to do basic programming using 8085 microprocessors. **CO 2:** Students will be able to differentiate between various types of nanomaterials. **CO 3:** Students will be able to understand difference between electrical data transmission and optical data transmission.
Semester V		
BUSPH501	**Mathematical Methods of Physics**	**CO 1:** Enable students to apply principles of physics. **CO 2:** To inculcate problem solving ability amongst the students.
BUSPH502	**Solid State Physics**	**CO 1:** Understand the basics of crystallography, Electrical properties of metals, Band Theory of solids, demarcation among the types of materials, Semiconductor Physics and Superconductivity. **CO 2:** Understand the basic concepts of Fermi probability distribution function, Density of states, conduction in semiconductors and BCS theory of superconductivity

BUSPH503	**Atomic and Molecular Physics**	**CO 1:** Analysis of Atoms by using Principles of Quantum Mechanics, Systematic development of Schrodinger's Equation for Atoms, Understanding Concept of Electron Spin and related problems. *{*Bloom's cognitive level- 1,3,4*}* **CO 2:** Understanding Spin-orbit interaction. Development of basic vector atom model. Mathematical Analysis of origin of spectral lines. Analyse the detect effect of magnetic field on atoms. *{*Bloom's cognitive level- 2,4,5*}* **CO 3:** Understand and analyse in detail the spectra of Diatomic Molecules. Mathematical formulation of Vibrational Spectra. Comparative analysis of classical and quantum theory. Application of Raman Effect to simple molecules. *{*Bloom's cognitive level- 2,3,5*}*
BUSPH504	**Electrodynamics**	**CO 1:** Explain basic concepts in electrostatics and 2-5 magnetostatics, identify and apply mathematical tools to solve arbitrary problems in electrostatics and magnetostatics. *{*Bloom's cognitive level- 2-5*}* **CO 2:** Explain concept of electromagnetic wave and its propagation through vacuum and medium with the help of solutions of Maxwell's equations. *{*Bloom's cognitive level- 1-4*}*
BUSACEI501	**Analog Circuits and Instruments**	**CO 1:** Enable students to study Construction and working of Electronic Devices. **CO 2:** To inculcate Circuit analysis ability among the students.
Semester VI		
BUSPH601	**Classical Mechanics**	**CO 1:** Students will be able to apply knowledge of Classical Physics to nature forces.

		CO 2: Students will be able to apply the conservation principles to fluids.
BUSPH602	**Electronics**	**CO 1:** Students will be able to understand and design electronic circuits using JFET, MOSFET and Thyristors. **CO 2:** Students will be able to design logic circuits using universal IC's.
BUSPH603	**Nuclear Physics**	**CO 1:** Explain the basic structure of the nucleus, including protons, neutrons, and binding forces. **CO 2:** Understand the different types of nuclear forces and their role in nuclear stability. **CO 3:** Utilize the laws of radioactive decay to solve problems involving half-life and activity. **CO 4:** Analyze the energy released in nuclear reactions and explain the concept of nuclear fission and fusion. **CO 5:** Evaluate the applications of nuclear physics in various fields like medicine, energy production, and material science. **CO 6:** Critically assess the ethical and societal implications of nuclear technology. **CO 7:**Apply and solve problems involving nuclear reactions, decay processes, and detector technology.
BUSPH604	**Special Theory of Relativity**	**CO 1:** Explain Galilean and Newtonian relativity with necessary mathematical formulations and describe Michelson-Morley experiment. *{Bloom's cognitive level- 1-5}* **CO 2:** Describe basic concepts of special theory of relativity including basic postulates and derive Lorentz Transformation Equations. *{Bloom's cognitive level- 1-4}* **CO 3:** Discuss relativistic kinematic and dynamics and explain inter-convertibility of matter and energy. *{Bloom's cognitive level- 1-4}*

		CO 4: Explain concepts like time dilation, length contraction twin paradox and solve problems based on these concepts. *{Bloom's cognitive level- 1-5}* **CO 5:** Derive transformation equations for electric and magnetic fields. *{Bloom's cognitive level- 5}* **CO 6:** Discuss basic concepts in Cosmology. *{Bloom's cognitive level- 1-4}*
BUSACEI601	**Digital Electronics, Microprocessor and its applications, Programming in C++**	**CO 1:** Students will be able to assemble digital circuits like encoders, latch and de-multiplexers. **CO 2:** Students will be able to do basic C++ Programming.

B. K. Birla College of Arts, Science & Commerce, Kalyan

Empowered Autonomous Status (2023-2032)

Bachelor in Chemistry

Program Specific Outcome

On completion of the B. Sc. Computer Science programme, students will be able to –

Program Specific Outcome of B. Sc.

A student completing bachelor's degree in science will be able to:

PSO 1	**Academic competence** 1. Understand the fundamental concepts of theoretical and experimental aspects of physical, organic, inorganic, analytical and allied chemistry subjects. 2. Explain and clarify the understanding of thermodynamic, spectroscopic, kinetic and quantum models, stereochemistry and mechanism of organic reactions, chemical bonding and structure elucidation, analytical techniques and solving numerical problems. 3. Correlate and apply the theoretical chemistry knowledge in explaining practical schemes.
PSO 2	**Personal and Professional Competence** 1. Solve numerical problems, mechanisms, analytical interpretation using chemistry concepts and knowledge. 2. Execute the knowledge of spectroscopic techniques learnt to characterize and identify structures of molecules used in drugs and pharmaceutical products. 3. Analyse chemical species qualitatively and quantitatively using appropriate analytical techniques.
PSO 3	**Research Competence** 1. Identify and understand research literature and appropriate techniques used in chemistry related problems. 2. Create awareness and promote research attitudes among students. 3. Interpret spectroscopic data to identify basic organic compounds.
PSO 4	**Entrepreneurial and Social competence** 1. Understand and explain the processes needed in domain related industries and write their general aspects.

	2. Apply information related to material safety data sheets (MSDS) needed in various industries. 3. Embraces reduce, recycle and restore chemicals (3R's) approach and gain the sense of ethical, social and environmental awareness and responsibility.

. Course Outcome (B. Sc.)

Semester I

Course Code	Title of Course	Course Outcome
BUSCH101	**General Chemistry-I**	**CO1**: Ability to understand the basic concepts of Thermodynamics such as system & its properties, Work & heat, H, G, E. **CO2:** Ability to understand & apply Zeroth, and the first law of Thermodynamics to calculate heat of reaction. **CO3:** Students will be able to understand the concept of reversible and irreversible reaction and law of mass action, Le Chatellier Principle and its application. **CO4:** Ability to prepare solution of different concentrations and carry out experiments based on titrimetric analysis & identification of an organic compound. **CO5:** Students will be able to understand the structure of an atom. **CO6:** Students will be able to identify a period and group in the periodic table and can list metals, nonmetals, metalloid and their general characteristics. **CO7:** Ability to write electronic configuration of elements. **CO8:** Students will understand the Rules of IUPAC, Nomenclature. **CO9:** Students learn hybridization of C, N and oxygen in organic reactions. Students learn about types of organic reactions
BUSCH102	**General Chemistry-II**	**CO1:** To understand the difference between order and molecularity of reactions.

		CO2: To understand and identify the reaction type based on order and molecularity. **CO3:** learner should be able to derive the derivation of First and Second Order reaction. **CO4:** Learner should be able to solve the numerical **CO5:** To understand atomic structure, classification of elements based on electronic configuration and periodic properties and their periodicity. **CO6:** To develop ability to understand concept of acid Base chemistry and knowledge of precipitation equilibria. **CO7:** Students are expected to apply their knowledge to problem solving, draw structures through visualization.
SEMESTER-II		
BUSCH201	**General Chemistry**	**CO1:** Ability to understand and apply Ideal gas law and van der Waal equation to calculate V, P, T of gas under given condition. **CO2:** Ability to understand the reason for the derivation of gases from ideal behavior & their significance. **CO3:** Ability to understand the concept of entropy & free energy & second law of Thermodynamics. **CO4:** Student will be able to understand the theory behind the preparation of solution of various N, M, m & ppm. **CO5:** To understand the fundamental concept of Acid-Base Chemistry. **CO6:** Testing of gaseous evolutes and precipitation equilibria. **CO7:** Understanding analysis with special reference to calculation of titration curve. **CO8:** Students will learn the IUPAC, Nomenclature of other functional groups. **CO9:** Students learn Classification and nomenclature rules, preparation and properties of various organic compounds.

BUSCH202	**General Chemistry II**	**CO1:** Learner will understand the meaning of electrolytes and their types with examples. **CO2:** Learner will understand the concept of Buffer solutions, their applications, types etc. **CO3:** Learner will be able to derive Henderson's derivation of acidic and basic buffer. **CO4:** Learner will understand different types of spectroscopies, applications. **CO5:** Learner will understand the basic concepts of solid-state chemistry. **CO6:** Learner will be able to write and understand the laws of crystallography. **CO7:** To understand atomic structure, classification of elements based on electronic configuration and periodic properties and their periodicity. **CO8:** To develop ability to understand concept of acid Base chemistry and knowledge of precipitation equilibria. **CO9:** Working through this course, students are expected to apply their knowledge for synthesizing simple organic molecules using studied reactions like Aromatic Electrophilic Substitution reaction.
SEMESTER-III		
BUSCH301	**Physical And Analytical Chemistry**	**CO1:** Ability to understand the need for the concept of fugacity & activity. **CO2:** Ability to understand the concept of transference number. **CO3:** Ability to understand the concept of conductance to determine k, alpha, $K_{sp.}$ **CO4:** Student will be able to understand the basic concept of molar conductance and equivalent conductance & their variation with dilution.

		CO5: Student will be able to understand the basic concept of H & G & their dependence w.r.t. P & T**.** **CO6:** Learner can Understand Nernst distribution Law, and validity and applications. **CO7:** Learners understand Raoult's law and can be able to solve the numerical based on it. **CO8:** Learner Can classify the complex reactions. **CO9:** Learner can distinguish between Unimolecular and bimolecular reactions. **CO10:** Learner understands the concept of Energy of activation and can solve the numerical. **CO11:** Ability to understand the need for the concept of Spectro [photometer and colorimeter] **CO12:** Ability to understand the concept of beer- Lamberts law and their application. **CO13:** Ability to understand the concept of photometry titration in order to calculate the end point of the solution.
BUSCH302	**Inorganic And Analytical Chemistry**	**CO1:** To develop the understanding directional and non-directional bonding in polyatomic species through orbital approach. **CO2:** To understand the concept of hybridization involving d-orbitals and can predict the geometry and structure of given molecule. **CO3:** To develop an understanding of the range and chemistry of elements in the periodic table and their compounds. **CO4:** To establish an appreciation of the role of inorganic chemistry in the chemical sciences **CO5:**Student should be able to understand and explain the theoretical principles and important applications of classical

		analytical methods within titration (acid/base titration), and various techniques within gravimetric analysis.
BUSCH303	**Organic And Industrial Chemistry**	**CO1:** Student will be able to understand nomenclature, preparation, properties and reactions of organic compounds. **CO2:** Student will be able to understand mechanism of nucleophilic addition to carbonyl group. **CO3:** Giving emphasis to green chemistry by introducing renewable and non-renewable sources of organic compound **CO4:** To apply chemistry to optimization of complex chemical processes in environmental management, and general industry. **CO5:** To know different sources of organic compounds. **CO6:** Environmental Aspect with reference to chemistry is made aware to them.
SEMESTER-IV		
BUSCH401	**Physical And Analytical Chemistry**	**CO1:** Ability to understand the concept of electrochemistry such as galvanic cell, anode, cathode electrode potential and EMF of cell, electrochemical series, Nernst equation and significance. **CO2:** Students will be able to calculate thermodynamic parameters of cell reactions and understand the significance of chemical and conc. cell. **CO3:** Student will be able to understand the basic concept of phase components and degree of freedom and Gibbs phase rule and its application to study H_2O and sulphur system. **CO4:**Learner understands amorphous and crystalline nature of crystals. **CO5:** Learner can understand Laws of Crystallography.

		CO6: Ability to understand the concept of theory behind pH metry and its application in biological field.
BUSCH402	**Inorganic And Analytical Chemistry**	**CO1:** Student will be able to understand nomenclature of the transition elements and their properties. **CO2:** Student will be able to understand Coordination Chemistry with respect to Werner's Theory of coordination compounds, Effective atomic number rule, Eighteen electron Rule. **CO3:** To provide an understanding of chemical methods employed for problem solving involving inorganic systems. **CO4:** Student will be able to understand theory and application basic analytical techniques like solvent extraction, TLC, Electrophoresis and Paper chromatography
BUSCH403	**Organic And Industrial Chemistry**	**CO1:** Students learn Reactions and reactivity of halogenated hydrocarbons. **CO2:** Students learns Organometallic compounds. **CO3:** Students learn about preparation, properties and applications of Alcohols, phenols and epoxides. **CO4:** Student will be able to understand nomenclature, preparation and properties of aromatic amines. **CO5:** Student will be able to understand diazotization reaction of aromatic amines. **CO6:** Learner will understand structures, aromaticity, preparation, properties and importance of heterocyclic compounds. **CO7:** Learner will apply laboratory chemistry to large and industrial- scale production for manufacture of some basic chemicals like acids and bases. **CO8:** Learn to make them understand the unit processes and their relevance in chemical industries.

SEMESTER-V		
BUSCH501	**Physical Chemistry**	**CO1:** Ability to understand and apply Ideal gas law and van der Waal equation to calculate V, P, T of gas under given condition. **CO2:** Ability to understand the reason for a derivation of gases from ideal behaviour & their significance. **CO3:** Ability to understand the concept of entropy & free energy & second law of Thermodynamics. **CO4:** Student will be able to understand the theoretical concepts of rotational, vibrational IR and Raman spectroscopy and their applications in determining bond length force constant and shape of molecule. **CO5:** Learner will be able to understand the basic thermodynamic concepts. **CO6:** Students understand the different colligative properties. **CO7:** Learner will be able to derive the derivation based upon Clauussius Clapeyeron Equation. **CO8:** Developed ability to solve numerical. **CO9:** Ability to understand characteristics of nuclear radiations and their detection and measurement. **CO10:** Student will be able to understand applications of radioisotopes is studying reaction mechanism and age determination. **CO11:** Student will be able to understand nuclear transmutation and artificial radioactivity with examples and can work out problems on Q-value.

		CO12: Student will be able to understand concepts of nuclear fission and fusion and significance of energy and its conversion into electricity using nuclear power reactor. **CO13:** Learner understands different types of chemical reactions like unimolecular and bimolecular. **CO14:** Students can understand postulates based on which different theories like collision theory and transition state theory. **CO15:** Learners can derive derivation for unimolecular and bimolecular reactions. **CO16:** Students can solve numerical.
BUSCH502	**Inorganic Chemistry**	**CO1:** Students will be able to understand the symmetry in molecules. **CO2:** Students will be able to draw the structure of inorganic solids. **CO3:** To study structure of inorganic solids. **CO4:** Students will know applications of stoichiometry. **CO5:** To develop the ability to understand the chemistry of f-block elements. **CO6:** Student will be able to explain properties of Lanthanons and Actinons and their periodicity. **CO7:** To know the occurrence, extraction and separation of lanthanides. **CO8:** Students will be able to explain Solvent extraction technique using TBP and HDEHP in detail. **CO9:** Student will be able to understand chemistry of Uranium with reference to occurrence and its isolation by solvent extraction technique. **CO10:** Students will be able to explain chemistry in non-aqueous solvents and their classification.

		CO11: Students will be able to explain Acid base reaction and complex formation in liq. Ammonia liq. dinitrogen tetroxide. **CO12:** Students will be able to explain chemical methods of synthesis of Nanomaterials, and the importance of nanomaterials. **CO13:** To know about the Nano films, nanowires, nanotubes and nanoparticles. **CO14:** To introduce the students with bio-inorganic and medicinal chemistry. **CO15:**To develop the ability to understand Metal Coordination in biological system and metal complexes in medicine.
BUSCH503	**Organic Chemistry**	**CO1:** Students will be able to understand the acidity and basicity. **CO2:** They will the mechanism involved in NGP. **CO3:** Stude will be able to understand fundamentals photochemistry and examples of photochemical reactions. **CO4:** Students will be able to understand the concept of Stereochemistry. **CO5: S**tudents will get knowledge about various Agrochemicals and their applications. **CO6:** Students will learn about Heterocyclic compounds and their reactions. **CO7:** They learn about Nomenclature of Cyclic compounds. **CO8:** They learn about green chemistry principle and green solvent, green reagent, green reaction. **CO9:**They understand about electromagnetic spectrum and their uses. **CO10:** They learn applications of basic theory and applications of UV and Mass spectroscopy for structure determination.

BUSCH504	**Analytical Chemistry**	**CO1:** Students are expected to understand the sources of error and different sampling techniques. **CO2:** Students will be able to understand principles and application of titrimetric analysis. **CO3:**Student will be able to understand theory behind Flame Emission spectroscopy (FES) and Atomic Absorption Spectroscopy (AAS) **CO4:** Student will be able to know Molecular Fluorescence and Phosphorescence Spectroscopy **CO5:** Student will be able to understand theory behind Turbidimetry and Nephelometry **CO6:** Student will be able to understand theory behind Solvent extraction, various factors affecting it, Craig's counter current extraction. **CO7: Student** will be able to understand theory behind HPLC, HPTLC.
BUSCH505	**Drugs And Dyes (Applied Component)**	**CO1:** To understand the Basic Introduction to drug (Nomenclature, Classification, and applications). **CO2:** To understand drug authority in India. **CO3:** Students will come to know the applications of different kinds of drugs like Analgesics, Antipyretics and Anti-inflammatory Drugs, Antihistaminic Drugs, Cardiovascular drugs, Antidiabetic Agents, Anti parkinsonism Drugs, Drugs for Respiratory System. **CO4:** To understand the basics of dyestuff industry. **CO5:** To understand important milestones in the development of synthetic dyes.

		CO6: Student will learn Colour and Chemical Constitution of Dyes. **CO7:**Student will be able to understand Unit process and Dye Intermediates.
SEMESTER-VI		
BUSCH601	**Physical Chemistry**	**CO1:** Ability to understand the concept of ionic strength, mean ionic activity & Debye-Huckel limiting law. **CO2:** Student will be able to understand the concept in applied electrochemistry & decomposition potential & overvoltage & their importance. **CO3:** Student will be able to understand the Tafel's equation & & overvoltage. **CO4:** Student will be able to understand the method to derive expression for emf of conc. Cell with and without transference and calculating emf of cell. **CO5:** Learner can understand all the basic concepts of Polymer. **CO6:** Learner understands the Mark Houwink equation for viscosity. **CO7:** Learner understands the function and operation of Ostwald's Viscometer. **CO8:** Learner will be able to solve numerical on Average molecular weights and Viscosity. **CO9:** Learner will be able to understand the Characteristics, method of preparation, advantages and disadvantages of LEP. **CO10:**Student will be able to understand limitations of classical mechanics and need of quantum mechanics with the help of photoelectric effect, Compton effect and black
BUSCH602	**Inorganic Chemistry**	**CO1:** Student will be able to understand coordination chemistry in detail. **CO2:** Student will be able to explain VBT, CFT, splitting of d-orbitals in

		octahedral, square planer and tetrahedral complexes. **CO3:**To develop the ability to calculate CFSE for octahedral complexes with d^0 to d^{10} metal ion configuration. **CO4:**will be able to explain the limitations of CFT, d-d transition, ESR spectrum and Nephelauxetic effect. **CO5:**To introduce the students with origin of electronic spectra. **CO6:** Student will be able to understand Types of electronic transitions in coordination compounds.
BUSCH603	**Organic Chemistry**	**CO1:** Students will be able to understand stereochemical approach in Substitution, Elimination and Addition reactions. **CO2:** Students will get introduced to Amino acids and Proteins. **CO3:** Students will be able to write the rearrangement reactions. **CO4:** Students will have very detailed knowledge of Carbohydrates. **CO5:** They learn Basic theory and applications of IR and PMR spectroscopy. **CO6:** They learn the by using spectral data how to solve the problems. **CO7:** They learn the polymers classification, synthesis, properties and uses. **CO8:** They learn about Catalyst and reagent for reductions reaction.
BUSCH604	**Analytical Chemistry**	**CO1:** Student will be able to know, what are Electroanalytical technique? **CO2:** They will also come to know, polarogram, polarizable electrode, non-polarizable electrode. **CO3:** Student will learn what is mean by Residual current, Diffusion current, limiting current, etc.

		CO4: Student will be able to know Dropping Mercury electrode. **CO5:** Student will be able to know Amperometric titration. **CO6:** Student will get the knowledge of Methods of separations like Gas Chromatography and Ion Exchange Chromatography

B. K. Birla College of Arts, Science & Commerce, Kalyan

Empowered Autonomous Status (2023-2032)

Bachelor in Zoology

Program Specific Outcome

On completion of the B. Sc. Computer Science programme, students will be able to –

Program Specific Outcome of B. Sc.

A student completing bachelor's degree in science will be able to:

PSO 1	**Academic competence** 4. Understand the fundamental concepts of theoretical and experimental aspects of physical, organic, inorganic, analytical and allied chemistry subjects. 5. Explain and clarify the understanding of thermodynamic, spectroscopic, kinetic and quantum models, stereochemistry and mechanism of organic reactions, chemical bonding and structure elucidation, analytical techniques and solving numerical problems. 6. Correlate and apply the theoretical chemistry knowledge in explaining practical schemes.
PSO 2	**Personal and Professional Competence** 4. Solve numerical problems, mechanisms, analytical interpretation using chemistry concepts and knowledge. 5. Execute the knowledge of spectroscopic techniques learnt to characterize and identify structures of molecules used in drugs and pharmaceutical products. 6. Analyse chemical species qualitatively and quantitatively using appropriate analytical techniques.
PSO 3	**Research Competence** 4. Identify and understand research literature and appropriate techniques used in chemistry related problems.

	5. Create awareness and promote research attitudes among students. 6. Interpret spectroscopic data to identify basic organic compounds.
PSO 4	**Entrepreneurial and Social competence** 4. Understand and explain the processes needed in domain related industries and write their general aspects. 5. Apply information related to material safety data sheets (MSDS) needed in various industries. 6. Embraces reduce, recycle and restore chemicals (3R's) approach and gain the sense of ethical, social and environmental awareness and responsibility.

. Course Outcome (B. Sc.)

Semester I		
Course Code	**Title of Course**	**Course Outcome**
BUSZO101	**Systematics-I and Biodiversity**	**CO1**: Ability to understand the basic concepts of Thermodynamics such as system & its properties, Work & heat, H, G, E. **CO2:** Ability to understand & apply Zeroth, and the first law of Thermodynamics to calculate heat of reaction. **CO3:** Students will be able to understand the concept of reversible and irreversible reaction and law of mass action, Le Chatellier Principle and its application. **CO4:** Ability to prepare solution of different concentrations and carry out experiments based on titrimetric analysis & identification of an organic compound. **CO5:** Students will be able to understand the structure of an atom. **CO6:** Students will be able to identify a period and group in the periodic table and can list metals, nonmetals, metalloid and their general characteristics. **CO7:** Ability to write electronic configuration of elements.

		CO8: Students will understand the Rules of IUPAC, Nomenclature. **CO9:** Students learn hybridization of C, N and oxygen in organic reactions. Students learn about types of organic reactions
BUSZO102	**Essentials in Biological Laboratories and Biostatistics**	**CO1:** To understand the difference between order and molecularity of reactions. **CO2:** To understand and identify the reaction type based on order and molecularity. **CO3:** learner should be able to derive the derivation of First and Second Order reaction. **CO4:** Learner should be able to solve the numerical **CO5:** To understand atomic structure, classification of elements based on electronic configuration and periodic properties and their periodicity. **CO6:** To develop ability to understand concept of acid Base chemistry and knowledge of precipitation equilibria. **CO7:** Students are expected to apply their knowledge to problem solving, draw structures through visualization.
SEMESTER-II		
BUSZO201	**Systematics-II and Ecosystem**	**CO1:** The students will learn to classify the non-chordate animals based on their characters. **CO2:** Special features of non-chordates will kindle their curiosity to learn more about these animals. **CO3:** Knowledge of ecosystem, biogeochemical cycles, Food chain, ecological pyramids etc will enable the students to correlate various phenomena like pollution, climate change and inter - relationship between organisms and their ecosystems.

BUSZO202	**Genetics, Evolution and Ethology**	**CO1:** The students will learn Mendelian and Non -Mendelian genetics and co-relate it with traits in man. Students will also learn to construct the pedigree chart based on the traits observed in their family. **CO2:** The students will learn animal behaviour and use their knowledge in studying the behaviour of animals in the natural environments, captivities, like zoos, breeding centre, and the animals housed in pharmaceutical companies. **CO3:** Students will get acquainted with various aspects of evolution, especially with reference to origin of earth, man and horse.
SEMESTER-III		
BUSZO301	**Chordate Systematics and Life Processes-I**	**CO1:** The students will recognize the distinguishing characters of each phylum and classify the animals. **CO2:** Students will learn life processes of several animals and compare them to understand the progressive development in the processes across kingdom Animalia. **CO3:** Students will develop skill of presenting life processes in the form of diagrams.
BUSZO302	**Molecular Biology, Biochemistry and Genetics**	**CO1:** Students will learn the molecular aspects of nucleic acids which include types, structure, function, and the process of protein synthesis in prokaryotes. **CO2:** The students will understand the role of biological macromolecules, their classification, and metabolic functions. **CO3**Learners will imbibe the structural morphology of chromosomes and their

		classification, chromosomal anomalies, and sex determination.
BUSZO303	**Parasitology, Fishery and Research Methodology**	**CO1:** Learners will understand the general epidemiological aspects of parasites that affect humans and apply simple preventive measures for the same and comprehend the life cycle of specific parasites, the symptoms of the disease and its treatment. **CO2:** Students will understand and learn about the use of different crafts and gears, breading of fishes and making value added products and develop the skills in fishery related cottage industries will develop qualities such as critical thinking and analysis. **CO3:** The students will develop the skills of Research methodology and scientific communication and will understand research ethics.
SEMESTER IV		
BUSZO401	**Chordate Life and Life Processes II and III**	**CO1:** Learners will understand the special features and unique characteristics among various classes of Phylum Chordata such as bioluminescence, Migration and parental care. **CO2:** Learners will understand the comparative aspects of vital life processes like respiration, circulation, control and coordination and reproduction. **CO3:** Students will learn to correlate the vital processes with each other.
BUSZO402	**Biotechnology, Cell biology and Embryology**	**CO1:** Learners will get the idea of Biotechnology, Cell biology and

		Embryology and their applications for further study. **CO2:** Students will understand the types of biological databases, their retrieval and classification. **CO3:** The students will understand working principles of various instruments required to perform the relevant practical in biotechnology and cell biology.
BUSZO403	**Applied Entomology, Animal Husbandry, Wildlife management and Zoogeography**	**CO1:** Learner will understand the geographic distribution of animals, the threats to the wildlife and methods for wildlife conservation and management. **CO2:** Learner will gain the knowledge and the skills in applied entomology and Animal husbandry. **CO3:** Students will be able to develop business startup or poultry / cattle farm and commercialization of biological products.
Semester- V		
BUSZO501	**Structural, Functional and Developmental Aspects of Animal Life-I**	**CO1:** Students would learn to understand and appreciate the structure function relationship of various parts of animal body, their developmental processes and use the knowledge not only professionally but also in day-to-day life.
BUSZO502	**Regulatory Aspects of Animal Life-I**	**CO1:** Students shall have the comprehensive knowledge of haematology which would help them in understanding the physiology of circulatory fluids and understand the diseases related to it. **CO2:** Enzymology and Immunology would increase the knowledge on defiance system in general and body's internal communication in general. These units are promising in specific as they

		would help the learners in improving their laboratory skills and precision in using chemicals.
BUSZO503	**Modern Aspects of Biological Sciences-I**	**CO1:** Students shall learn to understand the underlying principles of molecular mechanisms behind the control over the life. **CO2:** The knowledge acquired can help the students in writing JAM and other equivalent examinations. Students can find writing GRE examination easy for admissions in foreign universities.
BUSZO504	**General Aspects of Zoology and Bio nanotechnology**	**CO1:** Students shall learn to segregate and interpret the biological data, learn importance of natural resources in medication. **CO2:**Learn and find jobs in field related to pathology and get acquainted with systems of drug delivery, pollution control etc. using bio nanotechnology.
SEMESTER-VI		
BUSZO601	**Structural, Functional and Developmental Aspects of Animal Life-II**	**CO1:**Students would learn to understand and appreciate the structure function relationship of various parts of animal body, their developmental processes and use the knowledge not only Sq professionally but also in day-to-day life.
BUSZO602	**Regulatory Aspects of Animal Life -II**	**CO1:** Students shall have the comprehensive knowledge of haematology which would help them in understanding the physiology of circulatory fluids and understand the diseases related to it. **CO2:** Enzymology and Immunology would increase the knowledge on

		defiance system in general and body's internal communication in general. **CO3:** These units are promising in specific as they would help the learners in improving their laboratory skills and precision in using chemicals.
BUSZO603	**Modern Aspects of Biological Sciences-II**	**CO1:** Students shall learn to understand the underlying principles of molecular mechanisms behind the control over the life. **CO2:** The knowledge acquired can help the students in writing JAM and other equivalent examinations. Students can find writing GRE examination easy for admissions in forging universities.
BUSZO604	**General Aspects of Zoology and Bioinformatics.**	**CO1:** Students shall learn to understand and interpret the data on population and correlate that with demography and ecology. **CO2:** They will be able to understand the principles of epidemiology and understand the diseases which take the toll over the health of livestock and pets. **CO3:** Bioinformatics the new and interdisciplinary science shall help the students in understanding proteomics and genomics which shall help them in higher studies.