

Program outcomes, Program Specific Outcomes and Course outcomes

BBA (Bachelor of Business Administration)

Programme Outcomes

The Bachelor of Business Administration is a three-year degree program that teaches participants the nuances of business administration. They essentially teach students to manage businesses. Providing fundamentals and basics of management and business, the course enables students to understand the dynamics of running a business successfully.

Bachelor of Business Administration is a bachelor's degree program that has become one of the most sought after programs by the youth of the country. This program is so popular that it is slated to overtake the popularity of engineering and other courses.

BBA course helps you work independently by starting your own enterprise. This course doesn't simply focus on one field in particular. It covers the vast components of management training and education. Thus, it is labelled as a general management course.

- Students get in depth understanding of business administration.
- A BBA program is the foundation for further studies like MBA.
- It gives practical knowledge of corporate business activities.
- It improves business related decision making.
- It improves business skills.
- It provides knowledge of Marketing Strategies.
- With corporate and factory visits, it increases understanding for various cycles of business.
- It provides leadership skills.
- It provides internship with corporate houses leading to good job opportunities.
- It improves entrepreneurial skills.
- It teaches how to develop a business idea into reality.

Program specific outcome

- To develop an understanding of terms, facts, concepts pertaining to functions of management.
- To promote the understanding of various legislations relating to business.
- To develop the skill required for the preparation of financial statements and accounts of various business areas.
- To provide an understanding of basic concepts, theories and techniques in the field of human behaviour at the individual, group and organisational levels in the changing global scenario.
- The students with the basic knowledge of advertising and sales promotion.
- To provide the students with the basic knowledge of the theory and practice of banking and to provide skill in operating banking transactions.
- To promote an understanding of the determinants of consumer behaviour.
- To make them acquire knowledge on the legal aspects in the industries.
- Providing the students with an understanding of the various financial services available in the country.
- To familiarise the students with the basic conceptual skills and Applicative domains of Managerial

Course outcomes

BBA Degree Course covers vast cool subjects. Such as

- Business Organization.
- Communication Skills.
- Business Economics.
- Principles of Management.
- Principles of Marketing.
- Principles of Finance.
- Human Resource Management.
- Management Accounting.
- Financial Services

- International Business.
- Entrepreneurship Development.
- Salesmanship

This is not an exhaustive list, but it is clear that a BBA program enables a student to understand the total operations of a business. After completion of the course, a student can pursue a career in companies as Operations Manager, Sales Manager, Cost Estimator, and many other posts. The career scope of a BBA graduate is immense. It has been found in a study that many corporate companies hire BBA graduates for entry level positions.

DEPARTMENT OF COMMERCE

B.Com

Program Outcome

- This program could provide Industries, Banking Sectors, Insurance Companies, Financing companies, Transport Agencies, Warehousing etc., well trained professionals to meet the requirements.
- After completing graduation, students can get skills regarding various aspects like Marketing Manager, Selling Manager, over all Administration abilities of the Company.
- Capability of the students to make decisions at personal & professional level will increase after completion of this course.
- Students can independently start up their own Business.
- Students can get thorough knowledge of finance and commerce.
- The knowledge of different specializations in Accounting, costing, banking and finance with the practical exposure helps the students to stand in organization.

Program Specific Outcome

- The students can get the knowledge, skills and attitudes during the end of the B.com degree course.
- By goodness of the preparation they can turn into a Manager, Accountant , Management Accountant, cost Accountant, Bank Manager, Auditor, Company Secretary, Teacher, Professor, Stock Agents, Government

employments and so on.,

- Students will prove themselves in different professional exams like C.A. , C S, CMA, MPSC, UPSC. As well as other coeres.

- The students will acquire the knowledge, skill in different areas of communication, decision making, innovations and problem solving in day to day business activities.

- Students will gain thorough systematic and subject skills within various disciplines of finance, auditing and taxation, accounting, management, communication, computer.

- Students can also get the practical skills to work as accountant, audit assistant, tax consultant, and computer operator. As well as other financial supporting services.

- Students will learn relevant Advanced accounting career skills, applying both quantitative and qualitative knowledge to their future careers in business.

- Students will be able to do their higher education and can make research in the field of finance and commerce.

- To enable a student well versed in national as well as international trends.

- To enable the students for conducting business, accounting and auditing practices, role of regulatory bodies in corporate and financial sectors nature of various financial instruments.

- To provide in-depth understanding of all core areas specifically Advanced Accounting, International Accounting, Management, Security Market Operations and Business Environment, Research Methodology and Tax planning.

B.COM Degree course covers subject such as

- Financial accounting
- Business organization
- Business economics
- Environmental studies
- Principles management
- Marketing
- Business statistics
- Banking

- Human resource management
 - Company organization
 - Business communication
 - Business mathematics
 - Capital market
 - Import and export procedures
 - Computer application in business
 - Entrepreneurship development
 - Corporate accounting- I
 - Cost accounting
 - Business law
 - Income tax law and practice-I
 - Corporate accounting-2
 - Management accounting
 - Industrial law
 - Auditing
 - Income tax law and practice-II
 - Project
-
- To familiarize with Economic System & its types.
 - To enable the students to analyze Positive and Negative impact of Liberalization, Privatization and Globalization in Indian economy.
 - To make the students aware about provisions of FEMA, The Consumer Protection Act 1986, The Environment Protection Act 1986 and various regulatory policies of Indian Government.
 - To describe implication of Deficit Financing, Disinvestment of Public enterprises and Demonetization etc. in Indian Economy.
 - To introduce the students about the importance of Finance Management for a business.
 - To enable them to understand the various modes and techniques of managing the financial resources of an organization.
 - To know about the various factors to be considered while planning for financial policies.

- To acquaint the students regarding the various types of decisions taken by financial managers in current competitive environment.
- To enable students to select an investment project out of alternative investment proposals.

MCom

Program Specific Outcomes

After the completion of the M.Com Course, a student is able

- For pursuing research in their chosen areas.
- For teaching in Schools and Colleges after qualifying requisite tests.
- For working as data analyst.
- To work as investment consultants after a brief internship in suitable organizations absorbed in Banking and Insurance sector as executives

M.COM degree course covers subject such as

- Management accounting
- Advanced business statistics
- Management concept and organizational behavior
- Office automation
- Modern marketing management
- Financial management
- Quantitative techniques for decision making
- Legal frame work of business
- Business environment
- Retail management
- Entrepreneurship development
- Advanced corporate accounting

- Taxation and tax planning
- E-Commerce
- Human resource management
- Research methodology
- Modern banking
- Advanced cost accounting
- Tally -9.0
- Indirect taxation
- Financial market

Course outcome

- To introduce the concept of Research and Research Methodology.
- To enable the students to understand the Quantitative and Qualitative Methods for conducting research.
- To make students understand about Tabular and Graphical Description of Data.
- To enable the students to use SPSS for solving the research data.
- To enable the students to understand the Structure and Components of Research Report.
- To enable the students to write the research report using hypothetical data.

DEPARTMENT OF COMPUTER APPLICATIONS

B.C.A

Program Outcomes

Bachelor in Computer Application (BCA) is an undergraduate degree course in computer applications and is one of the popular courses among the students who want to make their career in the Information Technology field.

With the rapid growth of IT industry in India, the demand of computer professional is increasing day by day. This increasing growth of IT industry has created a lot of opportunities for the computer graduates.

Bachelor in Computer Application (BCA). The duration of the course is 3 years and divided into 6 semesters. It comprises of the subjects like database, networking, data structure, core programming languages like 'C', C++,PHP and 'java'. This course provides a lot of opportunities to the students who are interested in computer field and wants to work in the IT sector as programmer or software developer

Program specific outcomes

- 1.BCA gives a lot of opportunities to individual to go ahead and shine in their life.
- 2.Students get ability to apply knowledge of mathematics, science and engineering.
- 3.Students will able to know various issues and trends in technology and identify solutions to the existing problems.
4. Get skills and information in business fields and manage business operations .
- 5.Students will able to develop software skill and learn applications and modern techniques of IT.
- 6.Students improve their communication skills in the area of physical sciences.
- 7.Understanding of basic concepts, theories and techniques in the field of information technology.

8. An ability to design and conduct experiments to analyze and interpret data.

Course Outcomes:

After completing the course have ample job option in the IT and software field. One can do job or can go for higher studies after the completion of BCA course.

The demand of IT professionals is increasing not only in India but also in abroad, The student can find a job in reputed IT companies like IBM, Oracle, Infosys, Wipro, hp ,Cognizant, TCS, Syntel, HCL, NIIT. Dell, Tech Mahindra. Accenture, Hexaware Technologies Ltd. and Google as System Engineer, junior programmer, web developer or as a system administrator. Also they can make their career in the public sector.

Self employment option is also available. One can do freelancing or develop their own software if they have much skills.

After competing BCA they can go for advanced courses such as MCA and PhD. MCA can be specialized in systems management, systems development, management information system, etc. After the completion of MCA, candidate can also get the job of lecturer in any of the reputed institutions.

UG DEPARTMENT OF CHEMISTRY

B.Sc Chemistry

Program Outcomes

The purpose of the undergraduate chemistry program at the University of Manonmaniam Sundaranar is to provide the key knowledge base and laboratory resources to prepare students for careers as professionals in the field of chemistry, for graduate study in chemistry, biological chemistry and related fields, and for professional school including medical, dental, law and business programs.

- an understanding of major concepts, theoretical principles and experimental findings in chemistry.

- an ability to work effectively in diverse teams in both classroom and laboratory.
- an ability to employ critical thinking and efficient problem-solving skills in the four basic areas of chemistry (inorganic , organic, physical and analytical,).
- an ability to conduct experiments, analyze data, and interpret results, while observing responsible and ethical scientific conduct.
- effective written and oral communication skills, especially the ability to transmit complex technical information in a clear and concise manner.
- the ability to use modern instrumentation for chemical analysis and separation.
- the ability to use computers for chemical simulation and computation.
- a familiarity with, and application of safety and chemical hygiene regulations and practices.
- an ability to gain entry into professional schools, graduate programs, or the job market.

Program Specific Outcomes

- Knowledge :- Students will demonstrate a depth of knowledge and apply the methods of inquiry in a discipline of their choosing, and they will demonstrate a breadth of knowledge across their choice of varied disciplines.
- Critical Thinking :- Students will demonstrate the ability to access and interpret information, respond and adapt to changing situations, make complex decisions, solve problems, and evaluate actions.
- Communication:- Students will demonstrate the ability to communicate clearly and effectively.
- Diversity:- Students will demonstrate awareness and understanding of the skills necessary to live and work in a diverse world.
- Academic and Professional Integrity:- Students will demonstrate awareness and understanding of the ethical standards of their academic discipline and/or profession.
- Students will have a firm foundation in the fundamentals and application of current chemical and scientific theories including those in Analytical, Inorganic, Organic and Physical Chemistries.
- Students will be able to design and carry out scientific experiments as well as accurately record and analyze the results of such experiments.
- Students will be skilled in problem solving, critical thinking and analytical reasoning as applied to scientific problems.

- Students will be able to clearly communicate the results of scientific work in oral, written and electronic formats to both scientists and the public at large.
- Students will be able to explore new areas of research in both chemistry and allied fields of science and technology.
- Students will appreciate the central role of chemistry in our society and use this as a basis for ethical behavior in issues facing chemists including an understanding of safe handling of chemicals, environmental issues and key issues facing our society in energy, health and medicine.
- Students will be able to explain why chemistry is an integral activity for addressing social, economic, and environmental problems.
- Students will be able to function as a member of an interdisciplinary problem solving team.

Course Outcomes

- Have sound knowledge about the fundamentals and applications of chemical and scientific theories
- Every branch of Science and Technology is related to Chemistry
- Easily assess the properties of all elements discovered.
- Apply appropriate techniques for the qualitative and quantitative analysis of chemicals in laboratories and in industries.
- Will become familiar with the different branches of chemistry like analytical, organic, inorganic , physical, environmental, polymer and biochemistry
- Helps in understanding the causes of environmental pollution and can open up new methods for environmental pollution control.
- Develops analytical skills and problem solving skills requiring application of chemical principles.
- Acquires the ability to synthesise, separate and characterize compounds using laboratory and instrumentation techniques.

Analytical Chemistry

Principles of optical methods like AES, AAS, Plasma and Electric Discharge Spectroscopy, Spectrofluorimetry, Nephelometry and Turbidimetry, Potentiometric, Coulometric, and Voltametric methods of analysis. Chromatographic Techniques and applications.

Inorganic Chemistry

Chemistry of main group elements, and synthesis and properties of few main group compounds. General properties and separation of lanthanides and actinides. Basics of nuclear chemistry and radio analytical techniques. Stability of organometallic compounds and clusters, and their applications as industrial catalysts.

Organic Chemistry

Mechanistic aspects in nucleophilic and electrophilic substitution. Reaction conditions, products formation and mechanisms of some named reactions. Mechanisms of addition reactions of C=C and C=O bonds and elimination reactions

Physical Chemistry

Explain the spontaneity of a process and the conditions required for a spontaneous process. Describe different methods to determine rate law and derive the rate law for various chemical reactions including fast reactions. Explain collision and activated complex theory and determination of activation parameters for a reaction and homogeneous catalysis. Explain importance of adsorption process, heterogeneous catalysis, Langmuir, and BET model. Describe the concept of colloidal material, classification, synthesis and their stability for many practical uses.

Stereochemistry And Photochemistry

Conformational analysis of cycloalkanes, reactivity, chirality, interconversion, resolution and asymmetric synthesis. Aromaticity, nonaromaticity and antiaromaticity in carbocyclic and heterocyclic compounds. Molecular orbital symmetry and possibility of thermally and

photochemically pericyclic reactions. Basics of photochemical reactions of alkenes, carbonyl and aromatic compounds.

Organic Spectroscopy

Explain the principle and instrumentation of NMR spectroscopy, infrared vibration-rotation Raman and infra-red spectroscopy, vibration-rotation Raman and infra-red spectra for chemical analysis. Applications for studying functional groups of UV spectroscopy .

Coordination Chemistry

Explain the bonding in coordination complexes. Interpretation of the electronic and magnetic properties. Explain the formation and stability of the coordination complexes .Elucidate the kinetics and reaction mechanism of coordination complexes including redox reactions .

Quantum Chemistry

Explain Schrodinger equation for various quantum chemical models such as, particle in a box, harmonic oscillator, rigid rotor models and their quantum chemical description.Explain the operator algebra and their physical significance. Describe the electronic and Hamiltonian operators for H like atoms and quantum chemical description of angular momentum and term symbols for a one and many- electron systems. Describe the approximation methods to solve the Schrodinger equation of many electron systems and their application for to describe the concept of bonding.

Material Chemistry

Describe Unit cells, lattice types, crystal system and point defects in solids. Explain X -ray and electron diffraction for crystal structure analysis .Explain electrical and magnetic properties of materials.

Volumetric Analysis

To enable the students to acquire the quantitative skills in volumetric analysis.

Qualitative Analysis & Preparations Of Substance

Handle and use different organic and inorganic reagents. Set up organic and inorganic reactions and characterize products using spectroscopic techniques. Know the preparation, purification and characterization of different organic and inorganic compounds. To enable the students to understand various procedures in salt analysis.

Physical Chemistry Experiments

To be familiar with experimental techniques for controlling chemical reactions. Measure various physical and chemical properties of materials and the kinetics of a chemical reaction. Record and interpret the UV -Vis and IR spectra for structural analysis and kinetic studies. Development of experimental skills on conductivity meter, potentiometer, and pH meter for different applications.

DEPARTMENT OF INFORMATION TECHNOLOGY

BSc.IT

Objectives of the Programme are:

- To impart theoretical knowledge that underpins the various areas of information technology.
- To impart core computing skills and skill sets that are currently in demand in IT field.
- To encourage an inter-disciplinary interest for IT students.
- To create awareness on social, ethical and professional issues related to IT.

Outcomes of the Programme:

On completion of the course, the student will be able to

- Manage the hardware and software components in a computer system independently and bloom as a programmer in software industries.
- Have sound skills in designing databases and managing them.
- Have sound skills in designing web based applications.
- Have a good command of the English language for professional communication
- Have a variety of soft skills like technical documentation, presentation, quality awareness, team work, global outlook etc.
- Be aware of professional, ethical and social issues in the IT field.

- Have experience in successful completion of a medium sized real-life project in a team environment, in a time bound manner.

Programme Specific Outcomes:

On completion of the B.Sc.(Information Technology) Degree the graduates will be able to

- Analyze and recommend the appropriate IT infrastructure required for the implementation of a project
- Design, develop and test software systems for world-wide network of computers to provide solutions to real world problems.
- Handle the emerging IT scenarios by engaging in independent and life-long learning hence contributing to their professional development.

Course Outcomes

Programming in C:

Objective:

To know the concepts of procedure oriented programming and discussed the important features of C

Outcomes:

- Understand the concepts of structure programming.
- Ability to write simple application using C.

Introduction to Information Technology and HTML:

Objective:

To explain Internet technology and web design.

Outcomes:

- Gain knowledge of basic Internet protocols.
- Basic understanding of HTML tools for internet programming.
- Basic understanding of DHTML.

Office Automation:

Objective:

To gain fundamental knowledge of office automation packages.

Outcomes:

- Knows the application of computers in office in the day to day life.
- Knows method of doing simple calculation using spreadsheet package.
- Ability to present a product using PowerPoint.

Principles of Information Technology:

Objectives:

- To learn about information technology
- To know about AMPS, PCS, CDMI and MMDS.

Outcome: Knowledge in Frequency Spectrum, CDMA, TDMA, Wireless LAN are acquired.

Object oriented programming with C++:

Objectives:

- C++ Programming by examples can be used as an alternative approach to learn the language by putting practice over theory
- In any case this will require you to have greater level of expertise. You will need to understand how C++ files are organised, and have to know how to operate a compiler and understand some nuances that will not be visible in code.
- To understand that you will be able to read and program in C++, to some degree but to get to really understand the language, theory, not only practice is required.

Outcome: students will be able to write programs in C++.

Data Structures:

Objectives:

- To enable the student to understand the concepts of data structure such as arrays, stacks, queues, linked lists, trees and graphs.
- It also explains the different sorting and searching methods.

Outcome: Skills in linked list, stacks, search and sorting are obtained.

DTP:

Objective:

To impart the fundamental concept of DTP

Outcomes:

- Understanding of the various applications of DTP.
- Students can use PageMaker and CorelDraw for self-employment.

Java Programming:

Objectives:

- To enable the students to design and develop enterprise strength distributed and multi-tier applications using Java technology.
- To enable students to learn advanced Java programming concepts like interface, threads, applets etc, and to develop network programs in Java.

Outcome: Basic ideas of Java programming will be obtained.

Operating system:

Objectives:

- To have a thorough knowledge of processes, scheduling concepts, memory management, I/O and file management systems in operating system.
- To learn about UNIX and Linux operating system.

Outcome: Students will obtain knowledge in information, memory, and interprocess communication management of operating system.

Operation Research and Numerical Analysis:

Objectives:

- To know about transportation and assignment problems in Operation Research
- To solve sequencing problem and simultaneous equations.

Outcome: Students will be able to solve Transportation problem, Assignment problem, and sequencing problem.

Relational Database Management System:

Objectives:

- The area of relational database management system is crowded with a vast number of quality products.
- This paper Objectives to provide the students a strong foundation in database technology and to learn the fundamentals of data models to make a study of SQL and relational database design.

Outcome: Knowledge about design RDBMS, SQL, PL/SQL will be obtained.

Software Engineering:

Objectives:

- To learn the methodologies involved in the development and maintenance of software over its entire life cycle
- To understand the concepts of modelling, implementation and various testing strategies and the use of CASE tools.

Outcome: Obtain knowledge in software development process, testing and maintenance as well as CASE tools.

Wireless Application Protocol:

Objectives:

- To study about WAP architecture.
- To learn about WAP gateways
- To know about WML decks

Outcome: Students will obtain ideas about WAP application, gateways and WML.

Data Communications and Networking:

Objectives:

- To learn the concepts, terminologies and technologies used in modern days data communication and computer networking.
- To make the students to get familiarised with different protocols and network components.

Outcome: Students will obtain skills in different networking layers, protocols and components while data communication.

Multimedia Technology:

Objectives:

- To impart the fundamental concepts of Multimedia.
- To study the graphics techniques and algorithms, multimedia concepts.
- To enable the students to develop their creativity.

Outcome: Basic ideas of images, audio, video and animation are obtained.

.NET Programming:

Objectives:

- The objective of this course is to teach the design of web application for the students who already have mastered the fundamentals of the language.
- Students will learn to build and test larger projects using procedures, objects, debugging tools and data files.

Outcome: Students can develop programs in .NET application, HTML, XML and ADO access.

Management Information Systems:

Objectives:

- To develop and implement management information systems in order to deliver cost effective Information and Communication Technology (ICT) solutions that strengthen the efficiency of business processes, introduce better controls, greater accountability and improved decision making.

Outcome: Skills in MIS application will be improved.

Internet Security:

Objectives:

- To learn the basic concepts of computer security.
- To know the different classes of attack in security.
- To make the students to get familiarised with firewalls, proxy servers and cryptography.

Outcome: Knowledge will be obtained in internet security attacks, cryptography concepts.

Introduction to Information Technology:

Objectives:

- To discuss the basic structure and operation of a digital computer and to discuss in detail the operation of the arithmetic unit including the algorithms.
- To study the memory system including cache memories and to study different way of communicating with I/O devices and also scripting languages.

Outcome: Obtain knowledge in computer storage, I/O media and internet.

Basic Programming Design:

Objectives:

- To discuss the basic programming language and debugging.
- To study the multidimensional arrays.

Outcome: Students will acquire knowledge in algorithms, flowcharts and arrays.

DEPARTMENT OF COMPUTER SCIENCE

UG Program Outcomes

An ability to apply knowledge of **computing**, mathematics foundations, algorithmic principles, and computer science theory appropriate to the discipline.

An ability to identify, formulate, and develop solutions to computational and technical challenges.

An ability to design, implement, and evaluate a computational system to meet desired needs within realistic constraints.

UG Program Specific Outcomes

Our program educational objectives for students after graduating with a Bachelor of Science degree in Computer Science with 3 year program they will be:

- **Broadly Educated and Versatile.** Able to draw upon foundational knowledge, learn, adapt and successfully bring to bear analytical and computational approaches on changing social and technological challenges.
- **Inspiring and Collaborative.** Can be a leader and a responsible citizen whose strengths come from an ability to draw on and contribute to diverse teams, expertise, and experiences.
- **Innovative.** Drives scientific and technological advancement through technological innovation and entrepreneurship.
- **Scientific knowledge:** Apply the knowledge of mathematics, science, and computing to the solution of complex scientific problems.
- **Problem analysis:** Identify, formulate, research literature, and analyze complex scientific problems reaching substantiated conclusions using principles of mathematics, algorithm, and programming techniques.
- **Design/development of solutions:** Design solutions for complex problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- **Modern tools usage:** Create, select, and apply appropriate techniques, resources, and modern computing and IT tools including prediction and modeling to complex scientific activities with an understanding of the limitations.
- **The software engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional practice.
- **Environment and sustainability:** Understand the impact of the professional software engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the scientific practice.
- **Communication:** Communicate effectively on complex activities with the scientific community and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

- **Project management:** Demonstrate knowledge understanding of the scientific and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

UG Course Outcomes

A graduate with a B.Sc. in Computer Science will have the ability to demonstrate knowledge in various subjects like

Data Structures: To design efficient algorithms using various algorithm designing strategies. To analyze the problem and develop the algorithms related to these problems. To classify the problem and apply the appropriate design strategy to develop algorithm and to solve problems in efficient way.

Database Management Systems: To study types of NoSQL databases using in current scenario. To understand detailed architecture, define objects, load data, query data and performance. The study of methods to handle large volumes of structured, semi-structured, and unstructured data using database technologies.

Cloud computing: To understand the principles and paradigm of Cloud Computing. The technique to design and deploy Infrastructure in Cloud platform. To understand cloud security issues and solutions. The ability to understand the role of Virtualization and Orchestration technologies. Design & develop backup strategies for cloud data based on features and new need.

Software Engineering: To identify the impact of IT projects on the performance of the organizations. To understand, manage and develop IT infrastructure in different projects. To develop strategies to calculate risk factors involved in IT projects development. To use project management software to control the design, implementation, closure, and evaluation of IT projects. To estimate, plan, calculate, and adjust project variables. Apply project management practices to launch new programs, initiatives, products, services, and events relative to the needs of stakeholders.

Operating Systems: The course to understand internal structure and operations of Operating System along with various processes including scheduling, threading, inter process communication and synchronization with I/O operations. Awareness of computational issues, resources allocation, and task allocation in distributed environment.

Programming Language: The course is designed to provide complete knowledge of C, Cpp, Java, Dot Net, Visual Basic languages etc. Students will be able to develop logics which will help them to create programs, applications in various programming languages. Also by learning the basic **programming** constructs they can easily switch over to any other languages in future.

Android Programming: The course covers introductory mobile application development for the Android Operating System using XML and Java. It includes developing simple applications that could run on Android phones and tablets. It covers Android application development phases, terminologies, application design, and coding. It created the ability to install and configure Android application development tools.

Mobile Computing: To study the basic taxonomy and terminology of the computer networking and enumerate the layers of OSI model and TCP/IP model. To acquire knowledge of layer paradigms and protocols. To gain core knowledge of routing protocols, DNS and IP addressing.

Data Mining and Data Warehousing: To introduce the concept of data Mining as an important tool for enterprise data management and as a cutting edge technology for building competitive advantage. To enable students to effectively identify sources of data and process it for data mining. To make students well versed in all data mining algorithms, methods of evaluation. To impart knowledge of tools used for data mining. To provide knowledge on how to gather and analyze large sets of data to gain useful business understanding. To impart skills that can enable students to approach business problems analytically by identifying opportunities to derive business.

Computer Graphics and Multimedia: To explain the core concepts of **computer graphics**, including viewing, projection, perspective, modelling and transformation in two and three dimensions. The concepts of colour models, lighting and shading models, textures, ray tracing,

hidden surface elimination, anti-aliasing, and rendering. To use various multimedia tools and about animation concept.

Project: To demonstrate a depth of knowledge of modern technology. To complete an independent research project, resulting in at least a thesis publication, and research outputs in terms of publications in high impact factor journals, conference proceedings, and patents. Students will acquire the skills to communicate effectively and to present ideas clearly and coherently to specific audience in both the written and oral forms. Students will be able to learn on their own, reflect on their learning and take appropriate actions to improve it.

PG Program Outcomes

- An understanding of professional, ethical, legal, security, and social issues and responsibilities for the computing profession.
- An ability to communicate, analyze and engage effectively with diverse stakeholders, organizations and society.
- An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modelling and design of computational systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.
- An ability to achieve innovation ideas in research and development.

PG Program Specific Outcomes

Our program educational objectives for students after graduating with a Master of Science degree in Computer Science with 2 year program they will be:

- **Broadly Educated and Versatile.** Able to draw upon foundational knowledge, learn, adapt and successfully bring to bear analytical and computational approaches on changing social and technological challenges.
- **Inspiring and Collaborative.** Can be a leader and a responsible citizen whose strengths come from an ability to draw on and contribute to diverse teams, expertise, and experiences.

- **Innovative.** Drives scientific and technological advancement through technological innovation and entrepreneurship.
- **Scientific knowledge:** Apply the knowledge of mathematics, science, and computing to the solution of complex scientific problems.
- **Problem analysis:** Identify, formulate, research literature, and analyze complex scientific problems reaching substantiated conclusions using principles of mathematics, algorithm, and programming techniques.
- **Design/development of solutions:** Design solutions for complex problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- **Modern tools usage:** Create, select, and apply appropriate techniques, resources, and modern computing and IT tools including prediction and modeling to complex scientific activities with an understanding of the limitations.
- **The software engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional practice.
- **Environment and sustainability:** Understand the impact of the professional software engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the scientific practice.
- **Communication:** Communicate effectively on complex activities with the scientific community and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- **Project management:** Demonstrate knowledge understanding of the scientific and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

PG Course Comes:

Design and Analysis of Algorithm: To design efficient algorithms using various algorithm designing strategies. To analyze the problem and develop the algorithms related to these problems. To classify the problem and apply the appropriate design strategy to develop algorithm. To design algorithm in context of space and time complexity and apply asymptotic notation

Advanced Database Management System: To study types of NoSQL databases (Document oriented, keyValue pairs, Column-oriented and Graph). To understand detailed architecture, define objects, load data, query data and performance tune NoSQL databases. Able to handle large volumes of structured, semi-structured, and unstructured data using database technologies.

Cloud computing: To understand the principles and paradigm of Cloud Computing. Ability to design and deploy Cloud Infrastructure. Understand cloud security issues and solutions. Ability to understand role of Virtualization Technologies. Design & develop backup strategies for cloud data based on features Course

Artificial Intelligence: To analyze and formalize the problem as a state space, graph, design heuristics. Ability to represent solutions for various real-life problem domains using logic based techniques. Understand the numerous applications and huge possibilities in the field of AI. Ability to express the ideas in AI research and programming language• related to emerging technology.

Web Application Development: To understand the details of web services technologies like WSDL, UDDI, SOAP. Ability to learn how to implement and deploy web service client and server. Learn how to explore interoperability between different frameworks

Distributed Computing: To design and understand the following OS components: System calls, Schedulers, Memory management systems, Virtual Memory and Paging systems. To evaluate, and compare OS components through instrumentation for performance analysis. To analyze the various device and resource management techniques for timesharing and distributed systems. To develop and analyze simple concurrent programs using transactional memory and message passing, and to understand the trade-offs and implementation decisions

Mobile Computing: To gain knowledge of installing Android Studio and Cross Platform Integrated. Development Environment. An ability to use the techniques, skills, and modern

technology. To develop the different applications that mobile computing offers to people, employees, and businesses. To develop high levels of technical competence in the field of mobile technology.

Software Project Management: To identify the impact of IT projects on the performance of the organizations. To understand, manage and develop IT infrastructure in different projects. To develop strategies to calculate risk factors involved in IT projects. To use project management software to control the design, implementation, closure, and evaluation of IT projects. To estimate, plan, calculate, and adjust project variables. Apply project management practices to launch new programs, initiatives, products, services, and events relative to the needs of stakeholders.

Soft Computing: To discuss the ideas of fuzzy sets, fuzzy logic and use of heuristics based on human experience. To relate with neural networks that can learn from available examples and generalize to form appropriate rules for inference systems. To describe with genetic algorithms and other random search procedures useful while seeking global optimum in self-learning situations.

Mobile Computing: Student can understand internal structure and operations of OS along with various processes including threading, inter process communication and synchronization with I/O operations. Awareness of computational issues, resources in distributed environment. To develop mobile computing applications by analyzing their characteristics and requirements, selecting the appropriate computing models and software architectures, and applying standard programming languages and tools. To understand how the underlying wireless and mobile communication networks work, their technical features, and what kinds of applications they can support.

OOSD: To get good knowledge of the issues and challenges faced while doing the Software project Management. To understand why majority of the software projects fails and how that failure probability can be reduced effectively. To do the Project Scheduling, tracking, Risk analysis, Quality management and Project Cost estimation using different techniques. Students will learn a good communication skill, improve presentation and team forming ability.

Project: To demonstrate a depth of knowledge of modern technology. To complete an independent research project, resulting in at least a thesis publication, and research outputs in terms of publications in high impact factor journals, conference proceedings, and patents. Students will acquire the skills to communicate effectively and to present ideas clearly and coherently to specific audience in both the written and oral forms. Students will be able to learn on their own, reflect on their learning and take appropriate actions to improve it.

DEPARTMENT OF VISUAL COMMUNICATION

Program Outcomes

The Visual Communication degree as a creative profession has been the backbone of several of these Industries – Film, Television, Radio, Journalism, Advertising and Documentary. They also take care of several of these functions : Photography, Video Editing, Sound Design, Graphics & Animation. Development in digital technology has played significant role in the practice of this profession. It should also enable students to become an Entrepreneurs after completing the graduation.

The Visual Communication course will equip students with an understanding of how the Mass Media functions. Its role in past, present , future and learning its operational and artistic skills to make professional output. The field of Media is a constantly and rapidly changing one. So the focus of this course is not simply to teach students about Mass Media but rather to mould them with the technical skills and knowledge by creating an ambience for self-learning and self-reliance. This leads to the development of multi-skilled individuals who can contribute to various aspects of any Media organisation.

Program Specific Outcomes

1. Obtain a significant knowledge on fundamental and advanced aspects of Visual Communication

2. Gain in-depth knowledge on pre production, production and post production process in TV Production and Film Making
3. Gain proficiency in studio techniques such as Photography, Audiography and Videography
4. Gain the fundamental concept of Documentary and AD Filmmaking
5. Gain insight into the various aspects of Script Writing, Direction and Editing
6. Assimilate technical skills on Photography, Cinematography, Audio Editing and Video Editing, 2D and 3D Animation, Dubbing.

Course Outcomes:

On completion of this course, the students will be able to

1. Work in any Media corporates (TV, Radio, Newspaper, Advertisement, PRO) based on their specialization
2. Start their career as Assistants in Film Industry
3. Work as an Freelancer by getting individual media projects in areas like News Reporting, Camera, Video Editing, Sound Design, Graphics & Animation)
4. Start Media business by getting orders like Designing, Animation, Photography, Video/Audio Editing, Advertisement etc.
5. Media Related Jobs in Government and Non Governmental Organisations
6. Work as Technical Staff in Education/Religious/Medical Organisations
7. Start Media Institutes by teaching Multimedia subjects.

DEPARTMENT OF MATHS

BSc.Mathematics

Programme Outcomes

- Enabling students to develop a positive attitude towards mathematics as an interesting and valuable subject of study
- A student should get a relational understanding of Mathematical concepts and concerned structure and should be able to follow the patterns involved, mathematical reasoning
- Ability to analyze a problem, identify and define computing requirement which may be appropriate to its solutions
- Introduction to various courses like group theory, ring theory, field theory, metric spaces and number theory
- Enhancing students overall development and to equip them with mathematical modeling abilities, problem solving skill, creative talent and power of communication necessary for various kinds of employment
- Ability to pursue advanced studies and research in pure and applied mathematical science

Programme Specific Outcomes

- Think in a critical manner
- Know when there is a need for information, to be able to identify, locate, evaluate and effectively use that information for the issue or problem at hand
- Formulate and develop mathematical arguments in a logical manner
- Acquire good knowledge and understanding in advanced areas of mathematics and statistics, chosen by the student by the given courses
- Understand/ formulate and use quantitative models arising in social science business and other contexts

Course Outcomes

- Understanding of the fundamental axioms in mathematics and capability of developing ideas based on them.

- Inculcate mathematical reasoning
- Prepare and motivate students for research studies in mathematics and d related fields.
- Provide knowledge of a wide range of mathematical techniques and application of mathematical methods/ tools in scientific and engineering domains.
- Provide advanced knowledge on topics in pure mathematics, empowering the students to pursue higher degrees at reputed academic institutions.
- Strong foundation on algebraic topology and representation theory which have strong links and application in theoretical physics, in particular string theory.
- Good understanding of a number theory which can be used in modern online cryptographic technologies.
- Nature problem solving skills, thinking, creativity through assignments, project work.
- Assist students in preparing (personal guidance, books) for competitive exams. e.g. NET , GATE, etc.

DEPARTMENT OF ENGLISH

BA English

Programme Outcome

Literature courses in the department of English expose students to a wide range of writing from around the world. It helps students explore how writers use the creative resources of language-in fiction, poetry, nonfiction and drama-to explore the entire range of human thought and emotion. It instills a critical perspective with which students approach the disciplines. Usage of English language as a means of creative expression, will make the students as effective thinkers and communicators — qualities which are crucial for choosing careers in our information-intensive society.

Specific Programme Outcome

- Students use language as a means of creative expression which will make them effective thinkers and excellent communicators.
- By reading best literary traditions of the world students become more empathetic towards the plights of others and they probe in to the aesthetic merits of popular fictions.
- The students will be ignited enough to think and act over for the solution of various issues prevailed in the human life to make this world better than ever.

Course Outcome

SL.No	Subject	Outcome
1	Social History of England	Students acquired knowledge about the old, medieval and the modern period of England in a social, historical, political and cultural context.
2	Indian Writing in English	Familiarized students with the major Indian writers and their monumental works as an independent field of literature in English.
3	American Literature	Students recognized the universality of human experience reflected in the works produced by Americans.
4	Literary Forms	Students identified the unique feature of each literary form by comprehending its characteristics and conventions.
5	History of English Literature	Developed a knowledge of the evolution of the national sensibility through perceiving the principal works ,authors both major and minor, genres and periods of British literature.
6	Literary Critics	Provided an initiation to the fundamentals of literary criticism.
7	Effective Communication	It habituated the students to listen,speak,read and write in topics of

		social concern and engaged students to communicate their message with clarity and ease to a far larger audience.
8	Shakespeare	Developed an interest in Shakespearean language, his use of images and word play and comprehend the salient features and types of Shakespeare's play along with the knowledge of Shakespearean audience and theatre.
9	Womens Writing	Women's writing enable students to identify concepts of class, race and gender as social constructs and to explore the plurality of female experience in relation of these.
10	African Literature	Students understood the evolution of new literature and realized the plight and exploitation faced by indigenous people of Africa.
11	Canadian Literature	Created an awareness about the cross cultural and multicultural aspect in Canada
12	Grammar and Usage	Exposed students to the rudimentary knowledge of day to day use of English

		and identified and understood the different way in which grammar is described.
13	Journalism and Mass Communication	Exposed students to the function and responsibilities of news agency and improved and motivated the element of social consciousness in students.
14	Writing for Media.	It integrate writing and thought and sharpen students intellectual, social, moral, aesthetic and even spiritual faculties

Sl.NO	Subject	Outcome
1	British Literature I	Developed the working knowledge of major writers and Principal works from Chaucer to Jacobean
2	British Literature I	Demonstrated the noticeable socio political transition and its impacts on literature.
3	Indian Writing in English	Analysed and appreciated the idea of Indianess , Indian sensibility, inherent values and developed human concern through the versatile works of Indian writers
4	Journalism and Mass Communication	Created an awareness about the impacts and advantages of mass media in the present

		contexts.
5	American Literature	Developed a broader knowledge on human ideas, beliefs and social values and created an ability to contextualize a given work of American literature historically and culturally.
7	Shakespeare	Enabled the students to understand the social and cultural aspects of Shakespearean age and trained in the interpretation of Shakespearean language, image and his style of rhetoric.
8	Research Methodology	It enabled students to select, organize and define appropriate research problem and parameters.
9	English Language Teaching	It enlightens the students with the evolution of English language and how the cultural influence changed English from time to time.
10	World literature in English Translation	Developed sensible response to great classics in translation and fine tune analytical skills with a view to achieving a broad, wholesome vision of life .
11	Literature and Ecology	Generated a broad

		vision of life by making the students to come to grips with universal problems and varied life situations in an ecological point of view.
12	Literature and Gender	Through Gender studies students were aware about the issues and concerns of women and men in terms of personal, social and cultural perceptions
13	Literary theory and Criticism	By learning various literary theories students gain a critical insight about text and reality.
14	Post Colonial Literature	Post Colonial studies enable students to locate and represent subaltern voice.
15	Diasporic Writing	Created a cultural awareness and it helps to identify and understand cultural globalization in a true sense.
16	English Language Teaching	Comprehended different methods of teaching and testing

		English language and acquainted with psychology of learning and applying it to the classroom situations.
17	History of English Language	Comprehend the impact of political and social changes on the English language and motivated the students to take up advanced studies in the field of linguistics and stylistics.
18	Dissertation	Developed a spirit of critical and scholarly enquiry for the subject. Students organized and formatted their ideas in to a dissertation as per the MLA Handbook 8 edition.

DEPARTMENT OF BIOTECHNOLOGY

BSc.Biotechnology

Program outcome	<ol style="list-style-type: none"> 1. Acquire knowledge on the fundamentals of biotechnology for sound and solid base which enables them to understand the emerging and advanced engineering concepts in life sciences. 2. Acquire knowledge in domain of biotechnology enabling their applications in
------------------------	--

	industry and research.
Program specific outcome	Students of these programs shall gain profound knowledge in various disciplines viz., genetic engineering, microbiology, microbial Biotechnology, immunology, biochemistry, molecular biology, genomics, proteomics, environmental biotechnology, agricultural biotechnology, cell biology, nano-biotechnology, bioprocess technology, downstream processing, medical biotechnology, plant biotechnology, animal biotechnology, industrial biotechnology, nutritional biotechnology, various biotechnological ethics, useful microorganisms to cater the requirements of biotech industries, microbiology industries, agricultural industries, food & beverage industries, biochemical industries, fisheries pharmaceutical industries, research organizations, IT medical, academicians in private and government sectors.
Course: B.Sc., Biotechnology outcomes	
Basics of Biodiversity and conservation	To understand the basic principles and importance of biodiversity, need and means of conservation of biodiversity, and sustainable use of bio resources.

Cell Biology and genetics	To understand the basic concept of cell structure, cell organelles, sub cellular organelles, and cytoplasmic matrix, Laws of Mendel, and population genetics.
Biochemistry	To understand the classification, structure and properties of carbohydrates, polysaccharides, proteins, lipids, and nucleic acids, basic concepts of acids and bases, principle and operation of common laboratory instruments and separation techniques.
Instrumentation	To understand the basic concepts of preparation of buffers and stock solutions, principle and operation of the common instruments used in bioscience laboratories.
Molecular Biology	To understand the basic concepts of central dogma of molecular biology, regulation of gene expression, and regulation of protein synthesis.
Microbiology	Gain knowledge on the biology, types, genetics and interaction of microorganisms and mode of action of substances produced by them.
Biophysics	To understand the fundamental concepts of biophysics, explain the integration of physical theory into biological processes and identify/justify the biophysics tools for biological study/research.
Floriculture	To gain knowledge on the emerging trends in floriculture techniques, genetic improvement using strategies of Biotechnology and its application in industries
Vermi and Mushroom culture	It focuses on the biology of mushrooms, its cultivation techniques and management of diseases. This course is aimed to teach the students knowledge and skills, which allow them to establish a mushroom cultivation enterprise, or to cultivate mushrooms in a form of extra-earnings, or simply as a hobby.
Nutritional Biotechnology	It promotes awareness on the recommended

	<p>dietary allowances of each nutrient, their roles in human system and also the diseases resulting from their deficiency.</p>
Vector borne diseases	<p>Describes what a vector-borne disease is and the role of the host reservoir on parasite transmission, epidemiology and control of vectors and vector borne diseases and also their control strategies</p>
Immunology	<p>It provide students with a foundation in various immunological processes, how the immune system works building on their previous knowledge from biochemistry, genetics, cell biology and microbiology The students will be able to identify the cellular and molecular basis of immune responsiveness and to describe the roles of the immune system in both maintaining health and contributing to disease.</p>
Biostatistics	<p>It will enable the students to recognize the importance of data collection and its role in determining scope of inference, choose and apply appropriate statistical methods for analyzing one or two variables, interpret statistical results correctly, effectively and in context.</p>
Genetic diseases	<p>The students will be able to explain and categorize how genetic mutations cause disease and variable phenotypes in humans, describe the genetic basis of specific diseases and different therapies available.</p>
Cancer Biology	<p>The students will get an in-depth understanding of the molecular and cellular mechanisms that lead to cancer. They will be able to describe the fundamental mechanistic principles behind cancer diagnosis and prevention.</p>
Genetic Engineering	<p>The student will gain a basic understanding on various enzymes used in rDNA technology, construction of various cloning vectors, gene expression strategies, transgenic animal, their</p>

	application in pharmaceutical industry and human gene therapy.
Plant Biotechnology	Understanding the concepts and principles of plant tissue culture, learning different pathways of plant regeneration under <i>in vitro</i> conditions - organogenesis and somatic embryogenesis and genetic engineering of plants for the production of transgenic crops.
Basic Bioinformatics	The students will be able to apply knowledge and awareness of the basic principles and concepts of biology, computer science and mathematics. They will also be trained to use the existing software effectively to extract information from large databases and to use this information in computer modeling.
Nanobiotechnology	The students will acquire knowledge on the background on Nanoscience. They will understand the synthesis of nanomaterials and their application and the impact of nanomaterials on environment. The students will be trained to apply their learned knowledge to develop nanomaterials.
Genomics	Student will be able to describe the fundamental and molecular principles of genetics, understand the relationship between phenotype and genotype in human genetic traits, describe the basics of genetic mapping and understand how gene expression is regulated.
Clinical research	The students will be able to explain the regulatory and documentary requirements for conducting clinical trials, steps in drug discovery processes, types of ethical committee and data management in clinical trials.
Biosafety and Bioethics	It provides an overview of the ethical and legal issues associated with scientific research and practice in biotechnology. The students will gain an in depth knowledge about the critical aspects of Intellectual property rights and the relevant guidelines and regulations pertaining

	to protection of IPR.
Developmental Biology	It provides a comprehensive understanding of the concepts of early animal development. It also describes the main anatomical changes that occur during development and it will enable the students to identify the cellular behaviors that lead to morphological change during development.
Animal biotechnology	The students will be able to understand the concept and different types in animal cell culture, Use of molecular biology techniques to genetically engineer the animals to improve sustainability, productivity and suitability for pharmaceutical, agricultural and industrial applications.
Stem cell technology	Understand the role of stem cells in tissue engineering and regenerative medicine.
Bioprocess technology	The student will gain thorough knowledge of the underlying principles of main bioprocess unit operations like fermentation, downstream processing, production of microbial products related to pharmaceutical, food and agri-based industries.
The entire course will be of four semesters. Each student earns a minimum of 147 credits over the entire course.	
Course: M.Sc., Biotechnology outcomes	
Cell Biology	To understand the basic concept of cell structure, membrane, cellular functions of different types of cell, modes of transport across cellular membranes and cell cycle.
Biology and Microbial Physiology	To understand the basic concept of chemical foundations of biology; classification, structure and functions of carbohydrates, proteins and

	nucleic acids; microbial architecture and metabolism.
Molecular Biology and Genetics	To understand the basic concept of genome organization, central dogma, regulation of gene expression, principles of genetic interactions and population genetics.
Principles of Biotechnology	To familiarize students with the fundamental principles of biotechnology and its potential applications.
Biochemistry and Instrumentation	To understand the concepts of bioenergetics, structural and functional aspects of biomolecules, enzyme kinetics, applications and commercial production of enzymes.
Biology of Immune system	To impart Knowledge on the science of immunology, immune mechanisms operating in the body for combating infections, and the classification structure and mechanism of immune activation.
Bioprocess Technology	To impart Knowledge on basic principles of bioprocess, design of fermenter, aseptic operations and separation techniques to recover value added products from living organisms and application of biotechnological process in industries.
Nanobiotechnology	To understand the basic concepts of nanobiotechnology, principles of instrumentation, nanomaterials and their applications in the fields of medicine and scientific research.
Plant Biotechnology	To make the students to understand the concepts and applications of plant tissue culture, plant molecular biology and plant genetic engineering.
Animal Biotechnology	To impart knowledge on animal cell culture, monoclonal antibodies, <i>in vitro</i> fertilization, embryo transfer, recombinant vaccines, manipulation of growth of animals, pest management, and ethical issues related to

	animal biotechnology.
Stem Cell Biology	It helps the students to understand the basics of stem cells, embryonic stem cells, adult stem cells and genetic engineering of stem cells and their applications
Research Methodology and Biostatistics	It helps the students to understand the basic statistical analysis, to construct a research protocol and to carry out simple analysis of collected data and interpret findings appropriately.
Applied Bioinformatics	It provides basic knowledge on scope of Bioinformatics, Introduction to sequence alignment and programming, Database and their uses, Protein analysis using bio informatics tools and other special topics in bio informatics.
Proteomics and Genomics	It gives advanced level training on gene expression and gene therapy by covering topics such as genome mapping, proteomic techniques and new targets for drug discovery.
Medical Biotechnology	It imparts basic concepts of molecular basis of diseases, disease diagnosis, vaccinology, gene therapy and future prospects.
The entire course will be of four semesters. Each student earns a minimum of 90 credits over the entire course.	

DEPARTMENT OF MICROBIOLOGY

Programme Outcomes (POs)

By the Completion of the B.Sc. Microbiology Program, the students will be able to:

1. Execute their professional roles in society as Microbiology Professionals, employers and employees in various industries, researchers and educators in State, National and International firms.

2. Acquire in -depth analytical and Practical thinking to identify, formulate and solve the issues related to Microbiology and Biotechnology Industry, Pharmaceutical industry, Food,Dairy, Agricultural and Medical or hospital related organizations, & Academia.
3. Apply responsibilities to promote health and safety of the society and nation as well.
4. Develop soft skills, attitude and values required for self-directed, lifelong learning and Professional development.

Programme Specific Outcomes:

The various subjects in Microbiology syllabus emphasize distribution, morphology and physiology of microorganisms, in addition to Practical skills in aseptic procedures, isolation and identification. Acquire knowledge on the concept of disease development, spread, control and eradication from society and also understand the basic concepts of gene and their regulation of action . Learn the process of various industrial fermentations and Bioinstrumentation. The course also includes course material covering immunology, Microbial Genetics, Genetic Engineering , Bioinformatics, Microbial Biotechnology and Diagnostic Microbiology.

Course Outcomes (COs)

Sem I - Major Paper 1 - Fundamentals of Microbiology

By the end of this course, the students will be able to:

1. Understand the contributions of the Pioneers in the field of microbiology
2. Understand the ultra structure of bacterial cell.
3. Compare the differences in Gram positive and Gram negative bacteria.
4. Learn the basic principles of Microscopy, Structure and applications of different types of microscopes
5. Master the basic microbiological laboratory Techniques.

Sem I – Major Paper 2 - Microbial Diversity and Classification

By the end of this course, the students will be able to:

1. Understand the difference between Prokaryotic and Eukaryotic organisms
2. Understand the Structure, Morphology and importance of Archae bacteria and its types.
3. Learn the General characteristics and Reproduction in algae fungi and protozoa
4. Study the characteristics properties of virus with other miscellaneous microbes.
5. Compare the characteristics of different groups of micro organisms.

Sem I - Major Practical

By the end of this course, the students will be able to:

1. Learn the working and mechanism of different equipments used in microbiology
2. Assimilate preparation of nutrient media for cultivating microbes in laboratory
3. Perform the staining techniques like Gram staining, acid fast, capsular staining of various bacteria
4. Design an experiment to isolate bacteria from different samples
5. Understand the different methods of Pure culturing the bacteria

Sem II -Paper 1 - Microbial Physiology and Biochemistry

By the end of this course, the students will be able to:

1. Understand the basic nutritional requirements of bacteria
2. Describe various types of nutrient media for cultivation and isolation of bacteria
3. Understand different factors responsible for bacterial growth and about the typical growth curve of bacteria
4. Understand the Fermentation process , types and applications.
5. Learn the different types of Respiration in bacteria and other microbes.
6. Learn the structure, types and functions of Carbohydrates, Aminoacids, Proteins, Vitamins, Nucleic acids.

Sem II- Major Practical

By the end of this course, the students will be able to:

1. Master the techniques of culturing the bacteria.
2. Learn the biochemical tests like IMVic for identification of bacteria
3. Study and Practise the bacterial identification tests like catalase, Oxidase, Urease, TSI test etc
4. Demonstrate the effect of temperature, pH and Salinity on the growth of microorganisms.
5. Study the growth of bacteria and Draw the Growth curve.

Sem III - Paper 1 -Microbial Genetics

By the end of this course, the students will be able to:

1. Learn the Pioneers in the field of Genetics and the experiments to prove DNA and RNA as genetic material
2. Understand the Structure and function of Transposons, Reverse Transcriptase
3. Learn the Plasmid, structure, types,function, Application and replication in Plasmids
4. Study the genetics of different types of Bacteriophages.
5. Understand the concepts of Transformation, Transduction, Conjugation and Genetic Recombination in bacteria.

Sem III- Practicals - Microbial Genetics.

By the end of the course, the students will be able to:

1. Master the techniques of Isolating the Spontaneous mutants,
2. Learn and Practise the concept of UV mutagenesis, Chemical Mutagenesis.
3. Understand the process of Conjugation, Transformation and Transduction in E.coli
4. Master the techniques of Isolation of Plasmid DNA by Agarose gel Electrophoresis.
5. Learn and be an expert in the quantification of DNA by Diphenyl amine method and Protein by Bradford method

6. Demonstrate the development of antibiotic resistant mutant.

Sem IV- Paper- I - Fundamentals of Immunology.

By the end of the course, the students will be able to:

1. Learn the haematopoiesis process and the development of stem cells to functional Immune cells.
2. Study the structure and function of different types of immune cells like polymorphonuclear leukocytes, Killer cells, Natural Killer cells, Dendritic cells, Bcells, Tcells.
3. Understand the structure, Types and Functions of Immunoglobins, Structure of Antigen.
4. Master the serological techniques and its applications in Disease diagnosis.
5. Learn the MHC, Transplantation Immunology, Auto immune diseases and Hypersensitivity associated diseases.

Sem IV Practicals - Fundamentals of Immunology.

By the end of the course, the students will be able to:

1. Master the techniques of ABO Blood grouping and Rh typing
2. Perform total RBC , WBC and Total Platelets count from blood sample
3. Understand the methods of Antigen Preparation and Polyclonal Antibody Production
4. Master the serological test like WIDAL, Single Radial Immunodiffusion test
5. Learn and Practise Double Immuno diffusion test, ELISA Test

Sem V Paper 1- Agriculture Microbiology

By the end of this course, the students will be able to:

1. Understand the properties of soil, Soil Microorganisms

2. Study the different types of Microbial Interactions
3. Learn Various types of Biofertilizers and their preparation
4. Discuss the mechanism of Biological Nitrogen Fixation
5. Understand the Application of BioPesticides.

Sem V- Paper 1I - Industrial Microbiology

By the end of this course, the students will be able to:

1. Study the history and scope of Industrial microbiology
2. Understand the design, Types and operation of fermenters in various industries.
3. Explain the process of commercial production and ethanol, Vitamins, Beer, Wine, Penicillin etc.
4. Perform the methods of Production, harvesting and product recovery in industrial fermentations
5. Work out the Types of Fermentation process and its application in industries.

Sem V – Elective - Bioinformatics.

After the completion of the course, the students will be able to:

1. Learn the Principles and Application of RDBMS
2. Study Different types of Biological Databases
3. Understand the nucleotide sequence and protein sequence databases.
4. Study the Primary, Secondary and tertiary structure of proteins
5. Learn the Multiple Sequence Alignment, Local and Global Alignment
6. Study the Protein structure prediction, Homology Modelling and Drug Discovery.

Sem- V- Elective- Dairy Microbiology

By the end of this course, the students will be able to:

1. Understand the nutritive value of milk, Composition of milk, milk enzymes and antimicrobial systems in milk.
2. Learn the sources of microorganisms in milk and their pathogenicity.
3. Understand different dairy products and their methods of preparation.
4. Learn the microbial diseases due to milk borne pathogens
5. Study the basic Bacteriological test for the identification of microbes in milk.

Sem V- Practicals: Agriculture Microbiology

By the end of the course, the students will be able to:

1. Master the techniques of isolating soil bacteria, Fungi and Actinomycetes and Identification
2. Perform the test of finding the antagonistic activity of soil microbes
3. Understand the methods of isolating the microbes from rhizosphere
4. Master the techniques of isolating nitrogen fixers from soil Rhizobium, Azotobacter, Phosphate Solubilising bacteria.
5. Estimate soil pH, Nitrate, Sulphate, chloride and Phosphorous.

Sem V- Practicals: Industrial Microbiology

By the end of the course, the students will be able to:

1. Master the techniques of isolating industrially important microbes.
2. Perform the test for isolating Amylase and Protease producing bacteria.
3. Experiment the methods of Extracting the microbial enzymes
4. Master the techniques of cultivating Mushroom.

5. Practise the techniques of Vermicomposting and Wine Production

Sem V Practicals: Dairy Microbiology.

By the end of the course, the students will be able to:

1. Master the techniques of isolating microorganisms from milk
2. Perform the test of finding the quality of milk
3. Experiment the methods of preparation of Yoghurt
4. Master the techniques of Clot on Boiling test, Alcohol test
5. Learn the methods of isolation of lactobacillus from milk

Sem VI – Food Microbiology

By the end of this course, the students will be able to:

1. Understand how food acts as a substrate for microbes
2. Study various methods of Food preservation strategies.
3. Understand the mechanism of different food spoilage
4. Learn the food borne microorganisms and the disease caused by them
5. Study the methods of production of various fermented foods.

Sem VI - Major- Clinical Microbiology

By the end of this course, the students will be able to:

1. Learn the Normal Microflora, source of infections, Koch Postulates, Methods of Disease Transmission.
2. Understand Collection, Transport, and Culture methods of various pathogenic microbes
3. Learn the Pathogenicity, Lab diagnosis, Epidemiology, Treatment of various bacterial Pathogens

4. Learn the Pathogenicity, Laboratory diagnosis, Epidemiology, Treatment of various viral and Fungal Pathogens

5. Understand the types and causes of Nosocomial and zoonotic diseases

Sem VI- Major- Microbial Biotechnology

By the end of this course, the students will be able to:

1. Learn the Principle and application of rDNA technology

2. Understand the various methods of Transformation. Enzyme Production Technology, Enzyme immobilization and application.

3. Learn the methods of DNA sequencing, New generation Sequencing, Primer walking and short gun sequencing.

4. Learn the methods of development and Application of Transgenic Plants and Transgenic animals.

5. Understand the production of products like insulin, Gene therapy, Recombinant vaccine.

Sem V - Practicals- Food Microbiology

By the end of the course, the students will be able to:

1. Master the techniques of Enumerating Microbes from different foods

2. Perform the test for isolating and identifying microbes from fruits and vegetables.

3. Experiment the methods of isolating the microbes from grains.

4. Determine the techniques studying the Thermal Death time and Thermal death Point.

5. Isolate Yeast from grapes.

Sem V- Practicals - Clinical Microbiology

By the end of the course, the students will be able to:

1. Isolate normal Flora from mouth.

2. Isolate bacteria from pus, urine,

3. Experiment the antibiotic susceptibility testing by Disc Diffusion method
4. Identification of parasites by iodine wet mount method.
5. Learn the methods of Leishman staining, WIDAL TEST, ELISA technique.

Sem V - Practicals- Microbial Biotechnology

By the end of the course, the students will be able to:

1. Master the techniques of isolating microbes producing Enzymes,
2. Perform the Restriction Digestion of DNA, Ligation of insert DNA to Vector DNA
3. Understand the methods of Immobilisation of bacterial cells and enzymes
4. Master the techniques of producing Single cell protein
5. Production of Monoclonal Antibodies

Semester VI: Students Project.

To address and assess the diverse problems associated with various fields relevant to microbes through the techniques learnt to design managerial measures for a healthy environment.

Students will gain exposure to work with microbes for the production of various metabolic products like Antibiotics, Enzymes and so on.