UG PROGRAMME IN BOTANY

AIMS AND OBJECTIVES OF THE PROGRAMME

 The fundamental objective of the curriculum is to impart effective science education at the undergraduate level, exposing them to recent trends and developments in the subject.

 Creating scientific temper is another major objective of this curriculum. Incorporating research components along with a sound academic foundation enables students to develop independent creative thinking. Sufficient emphasis is given for training in laboratory skills and instrumentation. The curriculum is meant to inspire creativity and combine passion with critical thinking skills in students who one day will be the citizens working to convert the world to more sustainable systems.

 Another major thrust given here is to develop an environmental concern in all activities of the students. 'Go green', the motto of the syllabus emphasizes the urgent need to conserve nature without destruction of natural resources.

PROGRAMME OUTCOMES (POs)

1. **Critical Thinking**: Take informed actions after identifying the assumptions that frame students' thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at their ideas and decisions (intellectual, organizational, and personal) from different perspectives.
2. **Problem Solving**: Understand and solve problems of relevance to society to meet the specified needs using the knowledge, skills and attitudes acquired.
3. **Effective Communication**: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.
4. **Effective Citizenship**: Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.
5. **Environment and Sustainability**: Understand the issues of environmental contexts and sustainable development.
6. **Self-directed and Life-long Learning**: Acquire the ability to engage in independent and lifelong learning in the broadest context of socio-technological changes

PROGRAMME SPECIFIC OUTCOMES (PSOs)

1. **Scope and importance of Botany**: Understand scope and importance of Botany in every field especially in dealing with societal and environmental issues, agriculture, ethics and healthcare.
2. **Environmental concern**: Understand the and the role of plants in sustaining life on earth and the interrelationship between human beings and nature, create awareness on natural Resources and their importance in sustainable development, analyze the importance of biodiversity conservation, estimate biodiversity loss and develop conservation strategies.
3. **Scientific temper**: Develop scientific temper and undertake scientific projects.
4. **Practical applications**: Identify and classify plants according to the principles of plant systematics, apply techniques like plant propagation methods, organic farming, mushroom cultivation, preparation of biofertilizers, biopesticides etc. in daily life.
5. **Awareness on life processes**: Understand plant life processes, biomolecules, basic hereditary and evolutionary principles.

COURSE OUTCOME

Core Courses

CORE COURSE: 1 ANGIOSPERM ANATOMY, REPRODUCTIVE BOTANY AND PALYNOLOGY

By the end of the course, students are expected to:

1. Demonstrate the ability to differentiate plant organs by observing anatomical features.
2. Understand the non-living inclusions of plants and their significance.
3. Differentiate tissues and their functions.
4. Illustrate primary and secondary (normal and anomalous) structures of plant organs.
5. Explain various developmental details of angiosperms.
6. Realize the significance and applications of palynology.

CORE COURSE: 2 MICROBIOLOGY, MYCOLOGY, LICHENOLOGY AND PLANT PATHOLOGY

By the end of the course, students are expected to:

1. Understand basics of microbial life and their economic importance.
2. Develop general awareness on the diversity of microorganisms, fungi and lichens.
3. Analyze the ecological role played by bacteria, fungi and lichens

4. Identify plant diseases and find out control measures.

5. Realize the significance of plant diseases as far as crop production is concerned

CORE COURSE : 3 PHYCOLOGY, BRYOLOGY AND PTERIDOLOGY

By the end of the course, students are expected to:

1. Appreciate the diversity and evolutionary significance of lower plant groups.
2. Classify algae, bryophytes and pteridophytes.
3. Understand the economic and ecological importance of lower plant groups.

CORE COURSE: 4 METHODOLOGY AND PERSPECTIVES IN PLANT SCIENCE

By the end of the course, students are expected to:

1. Develop scientific temper and problem solving skills.
2. Undertake scientific projects and prepare project reports

3. Summarize, organize and display quantitative data and derive conclusions

4. Prepare permanent slides, applying the histochemical techniques

CORE COURSE 5: Practical Paper - I Angiosperm Anatomy, Reproductive Botany, Palynology, Microbiology, Mycology, Lichenology, Plant Pathology, Phycology, Bryology & Pteridology, Methodology and perspectives in Plant Science

CORE COURSE : 6 GYMNOSPERMS, PALAEOBOTANY, PHYTOGEOGRAPHY AND EVOLUTION

By the end of the course, students are expected to:

1. Understand the role of gymnosperms as a connecting link between pteridophytes and angiosperms
2. Appreciate the process of organic evolution.

3. Realize the importance of fossil study.

4. Understand the climatic conditions of the past and realize the changes happened

5. Recognize the phytogeographic zones of India

CORE COURSE: 7 ANGIOSPERM MORPHOLOGY AND SYSTEMATICS

By the end of the course, students are expected to:

1. Appreciate the diverse morphology of angiosperms.

2. Identify and classify plants based on taxonomic principles.

3. Make scientific illustrations of vegetative and reproductive structures of plants.

4. Develop the skill of scientific imaging of plants.

5. Realize the importance of field study. 6. Change their attitude towards over exploitation of rare/endemic plants.

CORE COURSE: 8 TISSUE CULTURE, HORTICULTURE, ECONOMIC BOTANY AND ETHNOBOTANY

By the end of the course, students are expected to:

1. Critically evaluate the advantages of tissue culture and horticulture over conventional methods of propagation.

2. Apply various horticultural practices in the field.

3. Experiment on the subject and try to become entrepreneurs.

4. Identify the economically important plants.

CORE COURSE: 9- CELL BIOLOGY AND BIOCHEMISTRY

COURSE OUTCOMES (COs) By the end of the course, students are expected to:

1. Appreciate the ultra-structure of a plant cell.

2. Enumerate the functions of each cell organelle.

3. Draw and explain the structure of biomolecule

CORE COURSE: 10- GENETICS AND PLANT BREEDING

By the end of the course, students are expected to:

1. Appreciate the facts behind heredity and variations.

2. Understand the basic principles of inheritance.

3. Solve problems related to classical genetics.

4. Predict the pattern of inheritance.

5. Understand various plant breeding techniques.

6. Realize the role of plant breeding in increasing crop productivity.

CORE COURSE: 11- BIOTECHNOLOGY, MOLECULAR BIOLOGY AND BIOINFORMATICS

By the end of the course, students are expected to:

1. Analyze the role of biotechnology in daily life.

2. Understand the basic aspects of bioinformatics.

3. Explain the concepts in molecular biology.

CORE COURSE: 12 -PLANT PHYSIOLOGY AND METABOLISM

By the end of the course, students are expected to:

1. Identify the physiological responses of plants.

2. Analyze the role of external factors in controlling the physiology of plants.

3. Explain the metabolic processes taking place in each cell.

4. Appreciate the energy fixing and energy releasing processes taking place in cells.

CORE COURSE: 13- ENVIRONMENTAL SCIENCE

By the end of the course, students are expected to:

1. Realize the importance of ecological studies.

2. Develop environmental concern in all their actions and practise Reduce, Reuse and Recycle.

3. Try to reduce pollution and environmental hazards and change their attitude towards throwing away plastic wastes.

4. Spread awareness of the need of conservation of biodiversity and natural resources.

5. Analyze the reasons for climate change and find out ways to combat it.

CORE COURSE: 14- ELECTIVE-2: ADVANCED ANGIOSPERM SYSTEMATICS

By the end of the course, students are expected to:

1. Develop deep knowledge in angiosperm systematics.

2. Demonstrate ability to identify and classify plants in a faster and better way.

3. Apply imaging technologies in plant systematics.

Core Course 15: Practical of Sem 5 (Paper- II)

Core Course 16: Practical of Sem 6 (Paper- III)

Core Course 17: Project Work/ Research methodology paper

Open Course

OPEN COURSE CHOICE- 2- APPLIED BOTANY

By the end of the course, students are expected to:

1.Develop general awareness on applied aspects of Plant science.

2.Realize the role of plants in everyday life.

3.Apply vegetative propagation methods in everyday life.

4.Realize the economic importance of plants

Complementary courses

COMPLEMENTARY COURSE: 1- ANGIOSPERM ANATOMY AND MICROTECHNIQUE

By the end of the course, students are expected to:

1. Explain the types, structure and functions of plant tissues.

2. Explain primary and secondary (normal and anomalous) structures of plant organs.

3. Identify plant organs by observing anatomical features.

4. Illustrate primary and secondary (normal and anomalous) structures of plant organs.

5. Apply the histochemical techniques in laboratory works.

COMPLEMENTARY COURSE: 2- CRYPTOGAMS, GYMNOSPERMS AND PLANT PATHOLOGY

By the end of the course, students are expected to:

1. Analyze the role of the lower plants in the process of evolution.

2. Explain the ecological significance of lower plants.

3. Identify plant diseases and take remedial measures to control them.

COMPLEMENTARY COURSE :3-MORPHOLOGY, SYSTEMATIC BOTANY, ECONOMIC BOTANY, PLANT BREEDING AND HORTICULTURE

By the end of the course, students are expected to:

1. Appreciate the diverse morphology of angiosperms.

2. Identify and classify plants based on taxonomic principles

3. Make scientific illustrations of vegetative and reproductive structures of plants

4. Identify the economically important plants

5. Understand the basic principles of plant breeding 6. Apply various horticultural practices in the field

COMPLEMENTARY COURSE: 4- PLANT PHYSIOLOGY, ECOLOGY AND GENETICS

By the end of the course, students are expected to:

1. Explain the physiological processes in plants.
2. Understand the basic principles of heredity and variation.
3. Realize the importance of ecology.
4. Spread awareness of the necessity of conservation of biodiversity and natural resources
5. Solve problems related to classical genetics

PG PROGRAMME IN BOTANY

AIMS AND OBJECTIVES OF THE PROGRAMME

- Clear, comprehensive and advanced mastery in the field of Botany.
- Creating scientific temper is another major objective of this curriculum.
- Incorporating research components along with deep study in the subject enables students to develop independent creative thinking.
- Understand the scope and significance of the discipline.
- Understand the advanced areas of biological sciences with special reference to Botany and its applied branches.
- Imbibe love and curiosity towards nature through the living plants.
- Ability to suggest innovative programs to care for nature and life for sustainable development.
- In order to make students open-minded and curious, we try our best to enhance and develop a scientific attitude.
- We make the students fit for the society by enabling them to work hard.
- Make the students exposed to the diverse life forms.
- The curriculum is meant to inspire creativity and combine passion with critical thinking skills in students who one day will be the citizens working to convert the world to more sustainable systems.
- Make them skilled in practical work, experiments, laboratory equipment and to interpret correctly on biological materials and data.
- Develop interest in Biological research.

- Develop a thirst to preserve the natural resources and environment.
- Develop the ability for the application of acquired knowledge in various fields of life so as to make our country self-sufficient
- Another major thrust given here is to develop an environmental concern in all activities of the students.
- Appreciate and apply ethical principles to biological science research and studies.

PROGRAMME OUTCOMES (POs)

1. **Critical Thinking with Scientific Temper**: Frame students' thinking and actions in such way to check out the degree to which the assumptions are accurate and valid with a research mind, and looking at their ideas and decisions (intellectual, organizational, and personal) from different perspectives.
2. **Research aptitude:** Enhanced observations kindle research aptitude which ultimately lead to additions to the existing knowledge base
3. **Effective Scientific Communication**: Read, write, listen and disseminate plant science with research knowledge, in person and through scientific platforms and journals.

4. **Problem Solving**: Understand and solve the problems with reference to Nature and society to meet the specified needs using the knowledge, skills and attitudes acquired.

5. **Effective Citizenship**: Demonstrate empathetic environmental and social concern for equity centered global development, and develop the ability to act with an informed awareness of issues and participate in civic life through volunteering.

5. **Environment and Sustainability**: Understand the issues of environmental contexts and sustainable development at global level.

6. **Independent and Life-long Learning**: Acquire the ability to engage in independent learning through research and lifelong learning in the broadest context of socio-technological changes

PROGRAMME SPECIFIC OUTCOMES (PSOs)

- After completing the PG course in Botany, the students will be able to acquire competency in the area of plant biology.
- Will be competent in differentiating the diverse groups of plants and microbes
- Will be well versatile in understanding the importance of nature and natural ecosystems along with sustainable utilization of natural resources for the betterment of humankind.

- Will have a sound understanding in the cultivation process of crop plants, its diseases and managing the diseases.
- Will be trained in acquiring the problem solving skills in environmental monitoring and pollution control measures
- Understand the importance of biodiversity conservation
- Gain knowledge in understanding the importance of research, its methodology, use of library & digital resources
- The use of sophisticated equipment and to demonstrate analytical ability to tackle the scientific research problems and also to maintain a high level of botanical research.
- Acquire the ability to understand life processes at cellular as well as molecular level
- Acquire core competency in distinguishing the internal structure of various groups of plants and knows the concept, process, physiology of plant development.

COURSE OUTCOMES (COs)

BOT1 C01. PHYCOLOGY, BRYOLOGY, PTERIDOLOGY AND GYMNOSPERMS

By the end of the course, students are expected to:

1. Provide knowledge on the occurrence and evolution of plant groups like Algae, Bryophytes, Pteridophytes and Gymnosperms.
2. Develop understanding on the classification, nomenclature, diversity and distribution in these plant groups.
3. Develop understanding on the range of variation in their structural and life cycle patterns, cellular organization and ecological / economic importance as separate plant groups.
4. Develop hands-on approaches to study algae and lichen populations and their growth forms in the surrounding environment.

BOT1C02: MYCOLOGY & LICHENOLOGY, MICROBIOLOGY AND PLANT PATHOLOGY

By the end of the course, students are expected to:

1. Develop understanding of the major groups of organisms like fungi, lichens and microorganisms, their occurrence, distribution and systematic classification.
2. Acquaint with the basic understanding of plant diseases, causative organisms, mode of action and measures for their control
3. Acquire practical knowledge on fungi, lichens, micro-organisms, plant pathogens and mode of their growth in specific habitats.
4. Develop understanding on the ecological and economic significance of the above groups

of organisms

BOT1C03. ANGIOSPERM ANATOMY, ANGIOSPERM EMBRYOLOGY, PALYNOLOGY & LAB TECHNIQUES

By the end of the course, students are expected to:

1. Develop understanding of the structural composition and functional organization in major land plants
2. Acquire knowledge on the reproduction and developmental processes associate with major land plants
3. Understand the significance of pollen studies in developmental process and the recent developments in palynology
4. Practical knowledge on cell and tissue organization, developmental stages and process associated with the reproduction in major land plants.

BOT1L01. PRACTICALS OF PHYCOLOGY, BRYOLOGY, PTERIDOLOGY, GYMNOSPERMS, MYCOLOGY AND LICHENOLOGY

By the end of the course, students are expected to:

1. Provide practical knowledge on the collection and identification of members of Algae, Fungi and Lichens
2. Provide practical knowledge on the collection of plant groups like Bryophytes, Pteridophytes, Gymnosperms and assessment of their morphological and anatomical features through laboratory exercises.

BOT1L02. PRACTICALS OF MICROBIOLOGY, PLANT PATHOLOGY, ANGIOSPERM TAXONOMY, ANGIOSPERM EMBRYOLOGY, PALYNOLOGY AND LAB TECHNIQUES.

By the end of the course, students are expected to:

1. Provide practical knowledge on the collection, culturing and identification of microorganisms (general and pathogenic) from specific habitats and evaluation of their growth performances.
2. Acquire hands-on experience on the tissue organization in major land plants.
3. Acquire practical knowledge in the reproductive structures of major land plants and the developmental processes associated with them.

BOT2C04. CELL BIOLOGY, MOLECULAR BIOLOGY AND BIOPHYSICS

By the end of the course, students are expected to:

1. Develop the understanding on cells, their structural and functional organization and the systematic process of growth and development.
2. Provide insight on various sub cellular materials in the molecular level and the processes associated with them, resulting in various metabolic activities.
3. Develop understanding and skills on various Biophysical methods used in cellular studies and the processes associated with them.

BOT2C05. CYTOGENTICS, GENETICS, BIOSTATISTICS, PLANT BREEDING AND EVOLUTION

By the end of the course, students are expected to:

1. Acquaint with cells and chromosomes, their structural and functional attributes, diversity and resultant manifestation on organisms.
2. Develop understanding of Mendelian Principles of Genetics.
3. Impart knowledge on human genome.
4. Provide an insight on the nature and type of data collection and its management.
5. Develop skills in data analysis using varied statistical software

BOT2C06. PLANT ECOLOGY, CONSERVATION BIOLOGY, PHYTOGEOGRAPHY AND FOREST BOTANY

By the end of the course, students are expected to:

1. Familiarity with various types of ecosystems and the ecological principles operating in each ecosystem.
2. Evaluate the threats associated with various ecosystems and an understanding of various management strategies for their conservation.
3. Understand the nature and pattern of distribution of plant communities and the reasons underlying it.
4. Understand the nature and type of forests; their ecological as well as economic contribution and strategies for their management

BOT2L03. PRACTICALS OF CELL BIOLOGY, MOLECULAR BIOLOGY, BIOPHYSICS, CYTOGENETICS

By the end of the course, students are expected to:

1. Demonstration of practical skills in the isolation of cell organelles and demonstration

of cellular processes

2. Demonstration of practical skills in the isolation of genetic materials from cellular systems and to familiarize recent methods for their characterization.
3. Develop abilities in the conduct of various experiments related to the physical and chemical separation of biochemical components.
4. Demonstration of practical skills in the area of Cytogenetics and its logical reasoning.
5. Develop skills in analyzing experiments related to the course materials, their interpretation and reporting.

BOT2L04. GENETICS, BIOSTATISTICS, PLANT BREEDING, PLANT ECOLOGY, CONSERVATION BIOLOGY, PHYTOGEOGRAPHY AND FOREST BOTANY

By the end of the course, students are expected to:

1. Develop skills in the statistical analysis of data, both manually and using statistical software.
2. Demonstration of practical skills in plant breeding and hybridization.
3. Develop abilities in the conduct of various experiments related to ecosystems evaluation and characterization.
4. Develop skills and abilities in assessing species composition and biotic interactions associated with heterogeneous ecosystems.
5. Demonstration of skills in the identification of phytogeographic areas, with special reference to forest biome.
6. Develop skills in evaluating the mandate of various organizations and their programmes in the priority areas specified in the course.

BOT3C07. PLANT PHYSIOLOGY, METABOLISM AND BIOCHEMISTRY

By the end of the course, students are expected to:

1. Understand various physiological processes associate with plant systems.
2. Understand various metabolic processes linked to biological systems.
3. Acquire knowledge on the properties of biomolecules (primary and secondary) and to understand the biochemistry of their action.

BOT3C08. ANGIOSPERM MORPHOLOGY, ANGIOSPERM TAXONOMY AND PLANT RESOURCES

By the end of the course, students are expected to:

1. Acquaint with the structure and organization of various plant organs and a detailed

analysis on their origin and evolution.

2. Understand various principles and practices of Plant Systematics.
3. Acquire knowledge on the recent development in plant systematics and the institutions involved in it.
4. develop understanding on the history, occurrence, and botanical characteristics of various plant resources of commercial importance.

BOT3C09. BIOTECHNOLOGY AND BIOINFORMATICS

By the end of the course, students are expected to:

1. Understand the basic principles and practices and develop skills in the advanced areas of plant tissue culture.
2. Acquire knowledge on the recent techniques and developments in Genetic Engineering and the legal procedures underlying genetic manipulation.
3. Acquaint with the principles and applications of Bioinformatics and to acquire skills in the use of computer aided Bioinformatics tools.

BOT3L05. PRACTICALS OF PLANT PHYSIOLOGY, METABOLISM, BIOCHEMISTRY, ANGIOSPERM MORPHOLOGY, ANGIOSPERM MORPHOLOGY AND TAXONOMY

By the end of the course, students are expected to:

1. Develop skills in conducting / demonstrating experiments related to various physiological processes in plants.
2. Demonstration of practical skills in the area of separation of biomolecules and their assays.
3. Develop abilities to test various biochemical components in plants using standard protocols.
4. Develop skills and abilities in assessing plant organs and to comment on their developmental processes.
5. Demonstration of skills in the collection, preservation and systematic elucidation of plant specimens to their respective families using conventional and modern methods.

BOT3L06. PRACTICALS OF PLANT RESOURCES, BIOTECHNOLOGY AND BIOINFORMATICS

By the end of the course, students are expected to:

1. Develop skills in the identification of plant specimens having commercial / economic value.
2. Develop skills and abilities in undertaking tissue culture protocols.
3. Develop skills and abilities in the separation of genetic materials from plant specimens.
4. Acquire skills in the use of computers for conventional applications and also for computational purposes using statistical software.
5. Demonstration of skills in using computer software relating to Bioinformatics purposes.

BOT4E01-6. Genetics and Crop Improvement

By the end of the course, students are expected to:

1. Develop advanced understanding of various crops of commercial importance and their genetic characteristics.
2. Develop understanding of the genetic configuration of important crops and methods for its hybridization for the production of better varieties.
3. Provide insights on various farming systems and methods adopted for bringing sustainability.
4. Develop hands-on skills in the study of floral characteristics of major crops.
5. Develop skills for the identification of weeds, pests and diseases and the development of agents for their control.

BOT4E02-3. Genetic Engineering

By the end of the course, students are expected to:

1. Develop advanced understanding of various concepts in the genomic characteristics of prokaryotes and eukaryotes.
2. Provide detailed insights on various methods and techniques used in gene sequencing, amplification and transfer.
3. Understand various concepts in the development of genetically engineered organisms for industries, health care and pollution abatement.

4. Develop hands-on skills in the separation / isolation of genetic materials and their characterization.

AUDIT COURSE

ACIAEC: Ability Enhancement Course: Scientific Documentation and Report writing

By the end of the course, students are expected to:

1. Provide insights on data collection, organizing research schedules, collection of databases and its interpretation, scientific writing and presentation of research findings on various platforms.

AC2PCC: Professional Competency Course: Intellectual Property Rights

By the end of the course, students are expected to:

1. Develop understanding of various legal provisions for safeguarding intellectual contributions from getting misused / exploited.

UG PROGRAMME IN CHEMISTRY

AIMS AND OBJECTIVES OF THE PROGRAMME

To understand basic facts and concepts in chemistry.

To apply the principles of chemistry.

To appreciate the achievements in chemistry and to know the role of chemistry in nature and in society.

To familiarize with the emerging areas of chemistry and their applications in various spheres of chemical sciences and to apprise the students of its relevance in future studies.

To develop skills in the proper handling of instruments and chemicals.

To familiarize with the different processes used in industries and their applications.

To develop an eco-friendly attitude by creating a sense of environmental awareness.

To be conversant with the applications of chemistry in day-to-day life.

Program outcomes – Program Specific outcomes

With the pace that the world keeps and the speed with which technology advances, an understanding of science is inevitable in our day-to-day life. To make the study of science interesting and enjoyable, the creation of a scientific temper in society is a must which could be achieved through proper education and guidance. An effective science education can be imparted at the undergraduate level only by revamping the curriculum according to the needs and developments of the modern society from time to time. To achieve this goal, the curriculum should be restructured by giving emphasis on various aspects such as the creativity of students, knowledge of current developments in the discipline, awareness of environmental impacts due to the development of science and technology, and the skills essential for handling equipment's and instruments in laboratories and industries.

Chemistry, being an experimental science, demands testing theories through practical laboratory experiences for a thorough understanding of the subject. Nowadays, chemistry laboratories in academic institutions use large amounts of chemicals. The ever rising cost of chemicals adversely affects many of the practical exercises. The fumes, gases and wastes produced during chemical reactions pollute the environment and affect public health. The awareness and implementation of eco-friendly experiments thus becomes a global necessity.

It is in this context, that the need for greener approaches becomes more relevant. It is essential to ensure that laboratory chemicals are used at a minimal level without affecting the skill and understanding aimed through laboratory sessions. The change brought about in the present scheme makes use of micro scale techniques and double burette titrations. This has been done without any conceptual deviation from the principles of experiments. This method not only reduces the expenditure on chemicals but also creates an environmental awareness among the students and pollution free atmosphere in the campus. This scheme saves time and energy of students while performing the experiments.

PROGRAMME OUTCOMES

This curriculum has been prepared with the objective of giving sound knowledge and understanding of chemistry to undergraduate students. The goal of the syllabus is to make the study of chemistry stimulating, relevant and interesting. It has been prepared with a view to equip students with the potential to contribute to academic and industrial environments. This curriculum will expose students to various fields in chemistry and develop interest in related disciplines. Chemistry, being a border science to biology, physics and engineering, has a key role to play in the understanding of these disciplines. After completion of B.Sc degree in Chemistry, students gained the theoretical as well as experimental knowledge of handling chemicals and its application for specific purposes. The student could expand the knowledge in Science and opportunities related to chemistry in the government/ private services in the field of food safety, health inspector, pharmacist etc. The updated syllabus is based on an interdisciplinary approach to understand the application of the subject in daily life.

PROGRAME SPECIFIC OUTCOMES

To enable the students

- To understand basic facts and concepts in chemistry.
- To develop the ability for applying the principles of chemistry.
- To appreciate the achievements in chemistry and to know the role of chemistry in nature and in society.
- To familiarize the emerging areas of chemistry and their applications in various spheres of chemical sciences and to apprise the students of its relevance in future studies.
- To develop skills in the proper handling of instruments and chemicals.
- To be exposed to the different processes used in industries and their applications.

- To make the students eco-friendly by creating a sense of environmental awareness in them.
- To make the students aware of the applications of chemistry in day-to-day life.

COURSE OUTCOME

Core Courses

CORE COURSE: 1 Theoretical and Inorganic Chemistry- I

CO1 To apply the methods of a research project.

CO2 To understand the principles behind volumetry.

CO3 To analyse the characteristics of different elements.

CO4 To distinguish between different acid base concepts.

CO5 To analyse the stability of different nuclei.

CORE COURSE: 2 Theoretical and Inorganic Chemistry- II

CO1 To understand the importance and the impact of quantum revolution in science.

CO2 To understand and apply the concept that the wave functions of hydrogen atom are nothing but atomic orbitals.

CO3 To understand that chemical bonding is the mixing of wave functions of the two combining atoms.

CO4 To understand the concept of hybridization as linear combination of orbitals of the same atom.

CO5 To inculcate an atomic/molecular level philosophy in the mind.

CORE COURSE : 3 PHYSICAL CHEMISTRY - I

CO1 To understand the properties of gaseous state and how it links to thermodynamic systems.

CO2 To understand the concepts of thermodynamics and it's relation to statistical thermodynamics.

CO3 To apply symmetry operations to categorize different molecules.

CORE COURSE: 4 ORGANIC CHEMISTRY– I

CO1 To apply the concept of stereochemistry to different compounds.

CO2 To understand the basic concepts of reaction mechanism.

CO3 To analyse the mechanism of a chemical reaction.

CO4 To analyse the stability of different aromatic systems.

CORE COURSE 5:INORGANIC CHEMISTRY PRACTICAL – I

CO1 To enable the students to develop skills in quatitative analysis and preparing inorganic complexes.

CO2 To understand the principles behind quantitative analysis.

CO3 To apply appropriate techniques of volumetric quantitative analysis in estimations.

CO4 To analyse the strength of different solutions.

CORE COURSE : 6 INORGANIC CHEMISTRY – III

CO1 To understand the principles behind quanlitative and quantitative analysis.

CO2 To understand basic processes of metallurgy and to analyse the merits of different alloys.

CO3 To understand the applications of different inorganic polymers.

CO4 To analyse different polluting agents.

CO5 To apply the principles of solid waste management.

CORE COURSE: 7 ORGANIC CHEMISTRY – II

CO1 To understand the difference between alcohols and phenols.

CO2 To understand the importance of ethers and epoxides.

CO3 To apply organometallic compounds in the preparation of different functional groups.

CO4 To apply different reagents for the inter conversion of aldehydes, carboxylic acids and acid derivatives.

CO5 To apply active methylene compounds in organic preparations.

CORE COURSE: 8 PHYSICAL CHEMISTRY – II

CO1 To apply the concept of kinetics, catalysis and photochemistry to various chemical and physical processes.

CO2 To characterise different molecules using spectral methods.

CO3 To understand various phase transitions and its applications.

CORE COURSE: 9 INORGANIC CHEMISTRY – IV

CO1 To understand the principles behind different instrumental methods.

CO2 To distinguish between lanthanides and actinides.

CO3 To appreciate the importance of CFT.

CO4 To understand the importance of metals in living systems.

CO5 To distinguish geometries of coordination compounds.

CORE COURSE: 10 ORGANIC CHEMISTRY – III

CO1 To elucidate the structure of simple organic compounds using spectral techniques.

CO2 To understand the basic structure and tests for carbohydrates.

CO3 To understand the basic components and importance of DNA.

CO4 To understand the basic structure and applications of alkaloids and terpenes.

CO5 To distinguish different pericyclic reactions.

CORE COURSE: 11 PHYSICAL CHEMISTRY – III

CO1 To understand the basic concepts of electrochemistry.

CO2 To understand the importance of colligative properties.

CO3 To relate the properties of materials/solids to the geometrical properties and chemical compositions.

CORE COURSE: 12 Advanced and Applied Chemistry

CO1 To understand the importance of nanomaterials.

CO2 To appreciate the importance of green approach in chemistry.

CO3 To understand the uses and importance of computational calculations in molecular design.

CO4 To understand the role of chemistry in human happiness index and life expectancy.

CORE COURSE: 13 Elective 2. POLYMER CHEMISTRY

CO1 To understand various classification of polymers and types of polymerisation methods.

CO2 To understand the important characteristics of polymers such as average molecular weight, glass transition temperature, viscoelasticity and degradation.

CO3 To appreciate the importance of processing techniques.

CORE COURSE: 14 PHYSICAL CHEMISTRY PRACTICAL

CO1 To enable the students to develop analytical skills in determining the physical properties (physical constants).

CO2 To develop skill in setting up an experimental method to determine the physical properties.

CO3 To understand the principles of Refractometry, Potentiometry and Conductometry.

Core Course 15: ORGANIC CHEMISTRY PRACTICAL

CO1 To enable the students to develop analytical skills in inorganic quantitative analysis.

CO2 To understand the principles behind gravimetry and to apply it in quantitative analysis.

CO3 To understand the principles behind colorimetry and to apply it in quantitative analysis.

Core Course 16: INORGANIC CHEMISTRY PRACTCAL-II

CO1 To enable the students to develop analytical skills in inorganic quantitative analysis.

CO2 To understand the principles behind gravimetry and to apply it in quantitative analysis.

CO3 To understand the principles behind colorimetry and to apply it in quantitative analysis.

Core Course 17: INORGANIC CHEMISTRY PRACTCAL-III

CO1 To enable the students to develop skills in inorganic quanlitative analysis.

CO2 To understand the principles behind inorganic mixture analysis and to apply it in quanlitative analysis.

CO3 To analyse systematically mixtures containing two cations and two anions.

Core Course 18: PROJECT WORK

CO1 To understand the scientific methods of research project.

CO2 To apply the scientific method in life situations.

CO3 To analyse scientific problems systematically.

Open Course

OPEN COURSE 1: ENVIRONMENTAL CHEMISTRY

CO 1: Recall the technical/scientific terms involved in pollution.

CO 2: Understand the causes and effects of air pollution.

CO 3: Understand the sources, types and effects of water pollution.

CO 4: Describe water quality parameters.

CO 5: Know soil, noise, thermal and radioactive pollutions and their effects.

CO 6: Study various pollution control measures.

CO 7: Understand the basics of green chemistry.

Complementary courses

COMPLEMENTARY COURSE: 1 GENERAL CHEMISTRY

CO1 To understand and to apply the theories of quantitative and qualitative analysis.

CO2 To understand the theories of chemical bonding.

CO3 To appreciate the uses of radioactive isotopes.

CO4 To understand the importance of metals in biological systems.

COMPLEMENTARY COURSE: 2 PHYSICAL CHEMISTRY

CO1 To understand the importance of free energy in defining spontaneity.

CO2 To realise the theories of different states of matter and their implication.

CO3 To understand the basic principles of electrochemistry.

COMPLEMENTARY COURSE :3 ORGANIC CHEMISTRY

CO1 To understand the basic concepts involved in reaction intermediates.

CO2 To realise the importance of optical activity and chirality.

CO3 To appreciate the importance of functional groups and aromatic stability.

CO4 To understand the basic structure and importance of carbohydrates, nucleic acids, alkaloids and

terpenes.

COMPLEMENTARY COURSE: 4 PHYSICAL AND APPLIED CHEMISTRY

CO1 To understand the basic concepts behind colloidal state and nanochemistry.

CO2 To understand the importance of green chemistry and pollution prevention.

CO3 To appreciate the importance of different separation methods and spectral techniques.

CO4 To understand the extent of chemistry in daily life.

COMPLEMENTARY COURSE: 5 CHEMISTRY PRACTICAL

CO1 To understand the basic concepts of inter group separation.

CO2 To enable the students to develop analytical and preparation skills.

PG PROGRAMME IN CHEMISTRY

PROGRAMME OUTCOMES

Theory

- Explain Schrodinger equation for various quantum chemical models such as, particle in a box, harmonic oscillator, rigid rotor models and their quantum chemical description
- Understand Hamiltonian operators and approximation methods and apply to many electron systems and chemical bonding
- Run various quantum chemical and molecular dynamics software, such as Gaussian, Gamess and explain chemical principles using computational modelling
- Understanding periodic table, main group elements, lanthanides, organomettalic complexes and the basics of nuclear chemistry and radio analytical techniques
- Study the concepts of green chemistry and applications of green chemistry for sustainable development
- Know the structure of supramolecules, molecular recognition and applications of supramolecules in miniaturization of molecular devices
- Discuss drug designing and development and mode of action of different drugs
- Study the mechanistic aspect of organic reactions and their conformational analysis and the conversion of different functional group via rearrangement reaction.
- correlate and differentiate Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac statistics and explain the partition function and specific heat capacities
- Solve structural problems based on UV-Vis, IR, 1HNMR, 13CNMR and mass spectral data.
- Explain the formation and stability of the coordination complexes

- Elucidate the kinetics and reaction mechanism of coordination complexes including redox reactions
- Elucidate the size -dependent physicochemical properties of nano materials and their characterisation techniques
- Understanding various synthesis steps that applies to industrial application
- Basic idea on applications of various instruments and their use
- To have an understanding on the effective use of Chemistry for the sustain progress and judicious use of resources of our mother nature

Practical

- Set up the apparatus for the purification, isolation, synthesis and characterization of certain compounds and operate and apply various spectroscopic techniques for identification and their quantification
- Handle and use different organic and inorganic reagents.
- To be familiar with experimental techniques for controlling chemical reactions
- Development of experimental skills on conductivity meter, potentiometer, pH meter and voltammeter for different applications
- To verify the basic laws in Physical Chemistry through experiments
- To have better understanding of concepts and to inculcate experimental skills in students

Project

- To expose the students to the literature review and how to design and execute small reaction schemes and to write a Project report/manuscript writing and presentation.

PROGRAMME SPECIFIC OUTCOMES

- To solve and understand the major concepts of chemistry
- To develop critical thinking and use of scientific knowledge to carry out and analyse chemical reactions
- Create an awareness of the impact of chemistry on the environment, society, and development outside the scientific community
- To inculcate the scientific temperament in the students guiding them to take research in high end areas and to use knowledge for the wellbeing of the community
- Apply appropriate techniques for the qualitative and quantitative analysis of chemicals in laboratories and in industries.
- Have sound knowledge about the fundamentals and applications of chemical and scientific theories

M.Sc. Chemistry : Course outcome

Semester 1 CHE1C01	**Quantum Mechanics and Computational Chemistry** 1) By the end of this course, students: will have a conceptual understanding of the laws of quantum mechanics necessary for the description of atoms and molecules and their chemical reaction; 2) Will be able to choose the appropriate method (in terms of applicability, accuracy, and economy) for the calculation Identify and explain the main similarities and differences between theoretical approaches such as HF (Hartree-Fock), DFT (Density Functional Theory) and force field methods. Describe and identify the various methods' advantages / disadvantages for simulating/modelling various scientific problems. 3) Choose and justify suitable methods for calculating electronic properties of simple molecules and crystals and be able to critically analyse the calculated properties
CHE1C02	**Elementary inorganic chemistry:** 1. Students will be learning and they will be able to think innovatively about the basic concept and principles of inorganic chemistry. 2. They also study about various properties of main group elements and its related compounds which make them to synthesis new compounds of inorganic interest. 3. They will know about the importance of nuclear chemistry, its related reactions and their applications.
CHE1C03	**Structure and reactivity of organic Compounds:** 1. Student should be able to apply the principles of stereochemistry to organic reactions 2. Student must be able to deliver the fundamental concepts of reaction mechanism in organic Chemistry.

CHE1C04	**Thermodynamics, kinetics, and catalysis:** 1. Students can understand the fundamentals of chemical thermodynamics 2. Students can solve the problems related to the feasibility of a physical/chemical processes 3. Students can correlate thermodynamics with Kinetics and catalysis 4. To get an overview of the reaction kinetics and surface chemistry in terms of established theories. 5. To predict the possible mechanisms involved in it. 6. To correlate the theory, predictions and mechanisms for day-to-day life activities.
Semester 2 CHE2C05	**Group theory and Chemical Bonding:** 1. Students should be able to apply the concepts of symmetry and group theory to chemical problems. 2. Students will learn the application of group theory to spectroscopy and quantum chemistry.
CHE2C06	**Coordination chemistry:** 1. An overview of the theories of bonding in coordination complexes. 2. Knowledge of the reactions and electronic spectral properties of coordination complexes. 3. Introduction to organometallic compounds of carbonyls, nitrosyls and related compounds
CHE2C07	**Reaction mechanism in Organic Chemistry** 1. Student should be able to recommend reagents and methods for functional group interconversions 2. Student should be able to design synthetic strategies for C-C bond formation. 3. Student should be able to deliver the concepts and methods of stereoselective synthesis and retrosynthesis
CHE2C08	**Electrochemistry, solid state chemistry, and Statistical Thermodynamics:** 1. Students can understand the fundamentals of Electrochemistry 2. Students can demonstrate and practically develop different electrochemical cells 3. Students can solve the problems in electrochemistry 4. Students completing this course will be able to understand the basics of various crystalline solids and their characteristics.

	5. They will be trained to get innovative ideas to make the new / unknown solid samples through different methods of preparation of solids with interesting properties which pronounces in many applications. 6. Students can correlate thermodynamics with quantum mechanics
CHE1L01 & CHE2L04	**Inorganic chemistry practical I &II** 1. Students will be trained to carry out the experiments on their own which helps them to attain more technical / practical skills. 2. They will understand how to estimate / quantify the presence of metal ions in a given mixture. 3. Students will get exposed to the qualitative analysis of inorganic cation analysis.
CHE1L02 & CHE2L05	**Organic chemistry Practical I &II** 1. Students should be able to execute basic laboratory techniques. 2. Students should be able to set up and monitor different types of reactions. 3. Students should be able to do purification and structural characterization of products obtained.
CHE1L03 & CHE2L06	**Physical chemistry practical I & II** 1. To familiarize students with hands-on experiments in various areas of physical chemistry
Semester 3 CHE3C09	**Molecular spectroscopy:** 1. Students should be able to predict the allowed transitions between various molecular energy levels. 2. Students should be able to deliver the theoretical basis of rotational, vibrational and Raman spectroscopy. 3. Students should be able to apply vibrational and electronic spectroscopy for the structural elucidation of chemical compounds. 4. Students should be able to apply spectroscopic methods for the structural elucidation of molecules. 5. Students should be able to choose spectroscopic methods for studying various chemical and physical properties of the molecules.

CHE3C10	**Organometallic &Bioinorganic chemistry:** 1. An overview structure, bonding, preparation and reactivity of organometallic compounds. 2. Information on the mechanism of the catalytic processes of organometallic complexes. 3. An elaborate content on the biological inorganic processes.
CHE3C11	**Reagents and Transformations in Organic Chemistry:** 1. Student should be able to deliver methods for the synthesis of compounds containing C=C / C=X bonds and their reactions 2. Student should be able to predict the stereochemical outcome of the reactions based on the various transition state models 3. Student should be able to deliver the principles and application of pericyclic reactions
CHE3E01	**Synthetic organic chemistry(Elective):** 1. Student should be able to recommend reagents and methods for functional group interconversions. 2. Student should be able to design synthetic strategies for C-C bond formation. 3. Student should be able to deliver the concepts and methods of stereoselective synthesis and retrosynthesis.
Semester 4 CHE4C12	**Instrumental Methods of Analysis:** 1. An overview of the separation, purification and analysis of chemical compounds. 2. Information about the instrumentation of modern sophisticated instruments. 3. Knowledge of the theory and principles of modern analytical methods.

CHE4E06	**Natural products & Polymer Chemistry (Elective):** 1 Student will gain insight into the chemistry and reactions of natural products. 2. The students shall get a clear idea regarding the chemistry involved in macromolecular formation. 3. The students shall learn the fine tuning of the properties of macromolecules and their characterization logically. 4. The various processes, through which product fabrication is done, based on macromolecules, shall be learnt by the students which shall support them to have a better interfacing with industries/ higher level research.
CHE4E08	**Organometallic Chemistry:** 1. An overview of application of coordination and organometallic complexes. 2. Information of the different structures of coordination compounds. 3. An elaborate introduction to contemporary research on transition metal complexes.
CHE3L07 & CHE4L10	**Inorganic Chemistry Practical III & IV:** Students will learn insight into the quantitative analysis of metal ions using volumetric and spectrophotometric techniques.
CHE3L08 & CHE4L11	**Organic chemistry practical III & IV:** Students will learn insight into the quantitative analysis of organic moleculres using volumetric and spectrophotometric techniques.
CHE3L09 & CHE4L12	**Physical Chemistry Practical III & IV:** Students will learn insight into the physical chemistry of kinetics, adsorption, phase diagram of three component system. Learn the practical aspects of Computational chemistry.
CHE4P01	**Research Project:** To equip the students for doing research in the frontier areas of chemistry.

B.com (Finance)

i. Programme Outcomes

- **For Industry**: B.Com (Finance) programme could provide to the organisations in the financial services sector a batch of well trained professional.
- **For Students**: After completing B.com (Finance) programme, students can get knowledge and skills regarding accounting, management, marketing, taxation, investment and legal aspects of starting and continuing a business organisation.
- Students will be able to conduct research activities by using standardized tools for data collection and analysis.
- Awareness about entrepreneurship will help the students to start up their own business.

ii. Programme Specific Outcomes

- B.com (Finance) programme provides a strong base for the students to pursue professional courses like CA, CS, ACCA and CMA
- Students will acquire knowledge and skills in decision making, problem solving and business analysis.
- Students will get the practical skills required for an accountant job, tax consultant, tax consultant and computer assistants.

iii. Course Outcomes

1. Core Courses	
1. **Business Management**	is course enables the students to know the process of business management and current management practices. It helps to create an awareness about the ethical practices for effective management
2. **Financial Accounting**	udents will get a practical knowledge about the preparation of financial statements for various types of organisations and the reporting standards.
3. **Business Regulations**	will familiarize students with certain statutes concerning and affecting business organisations in their operations
4. **Corporate Accounting**	is course enables the students to acquire conceptual knowledge of the fundamentals of corporate accounting and the preparation of financial statements of a company.
5. **Cost Accounting**	udents can acquire theoretical and practical knowledge about cost ascertainment and cost control.

6. **Corporate Regulations**	familiarize the students with corporate law and to make them aware of the importance of corporate governance in the management of organisations.
7. **Accounting for Management**	is course enables the students to understand the concept and relevance of management accounting and the use of accounting data for policy formulation and decision making by management.
8. **Business Research methods**	helps the students to acquire basic knowledge about business research method and a practical knowledge on conducting various researches.
9. **Income Tax law and Accounts**	e course enables the students to understand the process of computation of income under various heads. .
10. **Income Tax and GST**	udents can acquire the knowledge about computation of total income and tax liability of individual under Income Tax Act, 1961 and conceptual knowledge about GST Act 2016.
11. **Auditing and Corporate Governance**	helps to provide knowledge of accounting principles and techniques and to familiarize the students with the understanding of issues and practices of corporate governance in the global and Indian context.
2. Specialisation Courses (Finance)	
12. **Financial Markets and services**	provides knowledge about the structure, organisation and working of financial system in India.
13. **Fundamentals of Investment**	e course aims at familiarizing the students the concept of investment and a theoretical framework for the analysis and valuation of investment.
14. **Financial Derivatives**	helps the students to understand the concept of risk and working of derivative products for risk covering.
15. **Financial Management**	e course familiarize the students with the concept, tools and practices of financial management.
3. **Complementary Courses**	
16. **Managerial Economics**	enables the students to understand the concepts of micro and macro economics and its application in business management
17. **Marketing Management**	provides basic knowledge about the concepts, principles, tools and techniques of marketing and their application in the field of marketing.
18. **Human Resource Management**	e course equip the students with the basic knowledge and skills required for the acquisition, development and retention of human resources in an organisation
19. **Quantitative Techniques for Business**	e course familiarize the students with the use of quantitative techniques in managerial decision making
4. **Common Courses**	
20. **Basic Numerical Skills**	e course enables the students to acquire knowledge of mathematics and statistics and their application in business field.
21. **General Informatics**	e course facilitates to equip the students to effectively utilize the digital knowledge resources for their study.

22. **Entrepreneurship Development**	e course create innovative business ideas and to identify and develop entrepreneurial traits of students.
23. **Banking and insurance**	e course enables the students to acquire knowledge about basics of banking and insurance.
24. **Basic Accounting** (Open course)	e course provides an opportunity to students of non-commerce departments for getting an idea about the basics of accounting and the preparation of final accounts of a sole proprietorship concern.

B.com (Honours)

iv. Programme Outcomes

- **For Industry**: B.Com (Honours) programme could provide well trained professionals in finance, accounting and management areas.
- **For Students**: After completing B.com (Finance) programme, students can get knowledge and skills regarding accounting, management, insurance, banking, taxation and legal aspects of business organisations.
- Students will be able to conduct research activities by using standardized tools for data collection and analysis.
- Awareness about project finance will help the students to prepare project report and plan the future economic activities.

v. Programme Specific Outcomes

- B.com (Honours) programme provides a strong base for the students to pursue professional courses like CA, CS, ACCA, CMA and M.com
- Students will acquire knowledge and skills in decision making, problem solving and business analysis.
- Students will get the practical skills required for an accountant job, tax consultant, data analyst, data entry operator, HR assistant, Marketing assistant etc.
-

vi. Course Outcomes

25. **Communicative English**	is course helps to develop spoken communication skills,. written communication skills and soft skills among students
	e course enables the students to acquire knowledge

26. **Principles of Insurance**	on principles and practices of insurance
27. **Business Management**	e course familiarizes the students with the concepts and principles of management
28. **Financial Accounting**	is course enables the students to acquire conceptual knowledge of the fundamentals of book keeping, accounting and the preparation of financial statements.
29. **Basic Numerical Skills**	ter completing the course, the students will get an idea about set operations, matrix and mathematics of finance statistical tools and their applications.
30. **Modern Banking**	familiarize the students with basic knowledge of banking, changing scenario and E-banking services
31. **Managerial Economics**	is course enables the students to understand the micro and macroeconomic concepts relevant for business decisions.
32. **Marketing Management**	helps the students to acquire basic knowledge about traditional marketing, modern marketing, techniques of marketing and its applications.
33. **Human Resource Management**	e course enables the students to familiarize with the different aspects of managing Human Resource in the organisation. It also equip the students with appropriate knowledge and skills required for acquisition, development and retention of human resource.
34. **Quantitative Techniques**	udents can acquire the knowledge the use of statistical tools for validating findings and interpreting statistical results.
35. **Global Corporate and Business Law**	helps to develop knowledge and skills in the understanding of the general legal framework,
36. **Project Finance**	udents will be able to get an idea about sources and applications of funds and the concepts of project finance.
37. **Cost Accounting**	e course helps to develop knowledge and techniques cost accounting useful for management.
38. **Management Information System**	udents acquire knowledge about basic concepts of management information system and system implementation.
39. **Computer applications for Business and Research**	helps to develop practical knowledge on Tally and SPSS. After completing the course students will be able to use statistical tools in the field of research for validating findings and interpreting the statistical results.
40. **Financial Services**	provides the students with an overall idea about financial service sector in India.
41. **Financial Reporting**	ter completing the course, students can develop knowledge and skills in understanding and applying accounting standards .

42. **Auditing and Assurance**	provides an understanding of the process of carrying out the assurance engagement and its applications in industry.
43. **Goods and Service Tax**	enables the students to develop an understanding about indirect tax system and the working of GST in India.
44. **Operations Research**	e course provides practical understanding about the concept of operations research and its applications in management.
45. **Capital market**	he course enables the students to understand an overall idea about capital market and capital market operations in India.
46. **Governance, Risks and Ethics**	e course develops an understanding about the role of accountant in identifying and assessing the risks, public accountant's role in internal control, review and compliance.
47. **Organisational Behaviour**	ith this course, the students get an idea about the structure and behaviour of organisation and make them capable of realizing the competitiveness for firms.
48. **Performance Management**	e course inculcate skills in the application of management accounting techniques to quantitative and qualitative information for planning, decision making , evaluation and control.
49. **Income Tax law and Practice**	udents will be able to understand the basic principles and provisions of Income Tax Act, 1961and the computation of tax liability of individuals.
50. **Global Business Services**	helps the students to acquire the understanding about the global business systems and services.
51. **Business Research Methods**	completing this course, the students will get the knowledge about the process of doing research work and the practical side of project reports.
52. **Financial Management**	e course develops the knowledge and skills required for a finance manager in relation to investment, finance and dividend decisions
53. **Corporate Reporting**	e course enables the students to evaluate the financial reporting framework, prepare financial statements of groups of entities in accordance with relevant accounting standards and the implications on accounting regulations on industry.
54. **Business analysis**	ter completing this course, the students will be able to assess the strategic positions of an organisation, evaluating strategic choices and strategic implementation.

M.com (Finance)

vii. Programme Outcomes

- **For Industry**: M.Com (Finance) programme could provide to the organisations in the financial services sector a batch of well trained professionals. It helps to mould qualified Post Graduates for teaching profession.
- **For Students**: After completing M.com (Finance) programme, students can get knowledge and skills regarding accounting, management, research, taxation, investment and financial derivatives.
- Students will be able to conduct research activities by using standardized tools for data collection and analysis.

viii. Programme Specific Outcomes

- M.com programme provides a strong base for the students to qualify NET exam which enables them to become an Assistant Professor
- Students will acquire knowledge and skills in decision making, problem solving, tax planning, investment management, and accounting.
- It enables them to qualify other professional exams such as CA, CS, CMA and ACCA

ix. Course Outcomes

55. **Business Environment and Policy**	is course familiarizes with the concepts of macroeconomic in which a business organisation operates. The course enables them to take appropriate decisions in changing environments.
56. **Corporate Governance and Business ethics**	enables the students to understand the concept of corporate ethics, emerging trends in good governance practices and creating the corporate in global and Indian Context.
57. **Quantitative techniques for business decisions**	helps the students to acquire knowledge about most important quantitative techniques for business decision making.
58. **Management Theory and organistional behaviour**	e course familiarize the students with the concepts recent trends in management and organizational behaviour. It helps to create an awareness among the students about an ideal organizational culture.
	e course enable the students to understand and apply tools, techniques

59. **Advanced management accounting**	and concepts in managerial decision making process.
60. **Advanced Corporate Accounting**	helps to provide knowledge and skills in the theory and practice of corporate financial accounting and problem solving abilities.
61. **Advanced Strategic Management**	enables to get the knowledge about strategic management process, environmental analysis, strategic choice, strategic implementation, strategy evaluation and control.
62. **Advanced Cost accounting**	helps the students to acquire basic knowledge about business research method and a practical knowledge on conducting various researches.
63. **Management Science**	e course enables the students to understand the application of different operations research tools for managerial decision making. .
64. **Financial Management**	ter completing this course, students will get a clear idea about the basic analytical techniques and methods and their applications management of finance of an organisations.
65. **Research Methodology**	enables the students to conduct researches in the field of commerce and management.
66. **Investment Management**	helps to establish a conceptual framework for the study of security analysis and portfolio management.
67. **Financial Markets and Institutions**	helps to provide students a strong base regarding framework of financial markets, their inter-linkages and system of operating in India.
68. **International Finance**	e course familiarizes concepts and significance of international finance. Students will get awareness about international financial markets, exchange theories, foreign exchange exposure and risk management.
69. **Advanced Strategic Financial Management**	helps to build an understanding among students about the concepts, vital tools and techniques used for financial decision making by a business firm.
70. **Financial Derivatives and Risk Management**	e course is designed to make the students efficient in the areas of derivatives by giving the knowledge of basics in options, futures and swaps.
71. **Income Tax Law, Practice and Tax planning I**	enables the students to understand computation of income under various heads, taxable income of various entities, tax planning and procedure of assessment
72. **Income Tax Law , Practice and**	helps to provide theoretical and practical knowledge of assessment and tax planning of different assesses

Tax Planning II	
73. **International Business**	e course provides knowledge about international business environment, international trade, strategy development in international business and international business functional strategies.

B.Sc. COMPUTER SCIENCE

Programme Outcome (PO):

PO 1	An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computational systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.
PO 2	An understanding of professional, ethical, legal, security, and social issues and responsibilities for the computing profession.
PO 3	Develop effective communication skills in English and regional language
PO 4	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 5	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.
PO 6	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

Programme Specific Outcomes (PSOs):

PSO 1	Demonstrate mastery of Computer Science in the following core knowledge areas o Data Structures and Programming Languages o Databases, Software Engineering and Development o Computer Hardware and Architecture
PSO 2	Apply problem-solving skills and the knowledge of computer science to solve real world problems.
PSO 3	Develop technical project reports and present them orally among the Users

Course Outcomes:

Semester 1

BCS1B01: Computer Fundamentals and HTML.

CO 1	Get basic Concepts of Hardware and Software, Computer Languages, Hardware Components and Memory Hierarchy.
CO 2	Get the basic concepts of Computer Organization

CO 3	To have a better understanding on algorithm writing and drawing flowcharts for simple problem solving
CO 4	To get basics of internet and web page design using HTML and CSS.

Semester 2

BCS2B02: Problem Solving Using C

CO 1	To get a better understanding on fundamental principles of problem solving aspects.
CO 2	To learn the concept of programming.
CO 3	To study C language
CO 4	To equip the students to write programs for solving simple computing problem.

BCS2B03: HTML and Programming in C (Programming Laboratory I)

CO 1	To design web pages using HTML and CSS.
CO 2	To familiarize different programming environments.
CO 3	To practice procedural programming concepts using C.
CO 4	To equip the students to solve mathematical or scientific problems using C

Semester 3

A11– Python Programming

CO 1	To learn basics of Python programming
CO 2	To learn decision making, looping and functions in Python
CO 3	To Understand Object Oriented Programming using Python
CO 4	To Develop programs in Python programming language

A12– Sensors and Transducers

CO 1	To learn resistance, inductance and capacitance transducers.
CO 2	To Perceive the concepts of temperature and pressure transducers.
CO 3	To Perceive the concepts level transducers such as and flow transducers
CO 4	To Explain Electromagnetic transducers and radiation sensors

BCS3B04: Data Structures using C.

CO 1	To describe the concept of data structures.
CO 2	To make the students aware of various data structures.
CO 3	To equip the students implement fundamental data structures
CO 4	To equip the students to solve data structures problems using C

Semester 4

A13: Data Communication and Optical Fibers

CO 1	To understand the Basics of Communication Networks and Signal transmission
CO 2	To familiarise the activities and terminology in Mobile communication
CO 3	To Understand how the communication takes place using Optical Fiber system.
CO 4	To familiarise the terminology used in optical fibers.

A14: Microprocessors-Architecture and Programming

CO 1	To understand internals of Microprocessor.
CO 2	To learn architecture of 8085 Microprocessor
CO 3	To learn instruction set of 8085 Microprocessor
CO 4	To learn how to program a Microprocessor

BCS4B05: Database Management System and RDBMS

CO 1	To have a better understanding on the concept of database and database design.
CO 2	To get the basic concepts of RDBMS.
CO 3	To learn the concepts of database manipulation using SQL.
CO 4	To study PL/SQL language

BCS4B06: Data Structures and RDBMS (Programming Laboratory II)

CO 1	To have a better understanding on the concept of database and database design.
CO 2	To get the basic concepts of RDBMS.
CO 3	To learn the concepts of database manipulation using SQL.
CO 4	To study PL/SQL language

Semester 5

BCS5B07: Computer Organization and Architecture

CO 1	To learn logic gates, combinational circuits and sequential circuits.
CO 2	To get the concepts of basic computer organization.
CO 3	To learn the concepts of microprogrammed control and general processor organization.
CO 4	To learn the concepts of memory and input output organization.

BCS5B08: Java Programming

CO 1	To review on concept of OOP.
CO 2	To learn Java Programming Environments.
CO 3	To practice programming in Java.
CO 4	To learn GUI Application development in JAVA.

BCS5B09: Web Programming Using PHP

CO 1	To learn web Programming Environments.
CO 2	To practice web programming in PHP.

BCS5B10: Principles of Software Engineering

CO1	To learn engineering practices in Software development.
CO2	To learn various software development methodologies and practices.
CO3	To learn and study various Evaluation methods in Software Development

BCS5D01: Introduction to Computers and Office Automation

CO1	To learn basics of computer hardware and software
CO2	To learn text processing for office automation
CO3	To learn data analysis using spreadsheet
CO4	To learn how to make presentation and animations for various applications using powerpoint

Semester 6

BCS6B11: Android Programming

CO 1	To have a review on concept of Android programming.
CO 2	To learn Android Programming Environments.
CO 3	To practice programming in Android.
CO 4	To learn GUI Application development in Android platform with XML

BCS6B12: Operating Systems

CO 1	To learn objectives & functions of Operating Systems.
CO 2	To understand processes and its life cycle.
CO 3	To learn and understand various Memory and Scheduling Algorithms.
CO 4	To have an overall idea about the latest developments in Operating Systems.

BCS6B13: Computer Networks

CO 1	To learn about transmissions in Computer Networks.
CO 2	To learn various Protocols used in Communication.
CO 3	To have a general idea on Network Administration.

BCS6B14: Lab Exam Vth Sem. Java and PHP Programming(Programming Laboratory III)

CO 1	To practice client side and server side scripting.
CO 2	To practice Java and PHP Programming.
CO 3	To practice developing dynamic websites
CO 4	To practice how to interact with databases through PHP.

BCS6B15: Android and Linux Shell Programming(Programming Laboratory IV)

CO 1	To practice Android programming.
CO 2	To practice user interface applications.
CO 3	To develop mobile application.
CO 4	To practice shell programming

BCS6B16a: System Software

CO 1	To build fundamental knowledge in system software.
CO 2	To learn functions of various system software.
CO 3	To learn specifically the compilation process of a program

BCS6B17: Industrial Visit and Project Work

CO 1	Develop a quality software solution by following software engineering principles and practices.
CO 2	Develop a platform to demonstrate their practical and theoretical skills.
CO 3	Practice knowledge on software development process.
CO 4	Industrial Visit to provide an exposure to students about practical working environment
CO5	To gain full awareness about industrial practices

BA ECONOMICS

Aims and Objectives

The Bachelor's degree Programme in Economics aims to provide theoretical and practical knowledge that makes accurate analysis of the economic situation possible. The Calicut University Economics graduates must be able to understand the interrelation between the economy and society; to consider economic problems from a global perspective and take a local approach to solving them; to make connections between an economic system's different components; to gauge the implications of decisions related to economic policy; and to respond to the economic problems arising from society in general and the different units that interact therein (e.g. institutions, private companies and sectors of the economy). The curriculum covers topics from expanding markets to the impact of 2008 global financial crisis. It provides an excellent background for those who plan careers in government and private enterprise as well as those pursuing graduate degrees in professional schools or in the field of economics

Programme Outcomes: The learners are expected to demonstrate the following:

- Critically evaluate and apply the theories and techniques of economics.
- Demonstrate subject-specific 'thinking' skills that are readily transferable to problem solving and decision making in a wider context.
- Enhance their lifelong learning, employing a range of practical and professional skills.
- Find, evaluate, synthesize and use information from a variety of sources
- Articulate an awareness of the social and community contexts within their disciplinary field

Programme specific Outcome

The programme imparts an aptitude to understand the economic situation of the country. Analytical skills are inculcated to help the students become economic analysts. The projects done during the programme helps in performing empirical data analysis using software packages. Knowledge of economics helps the students to gain insights into various government policies; budget, taxation and expenditure policies, foreign policies, trade policies etc. It creates the groundwork for enhancing ability in policy making and forecasting.

Course outcome

The attainment of course outcome is evaluated based on the comprehensive continuous internal evaluation of the students as well as their performance in the external examination conducted by the University. The performance of the students in academic programmes such as research projects, field visits, industry visits and study tours as well as their participation in the activities of various clubs and social service and community development programmes are reckoned while deciding on the attainment of POs and COs. The use of ICT enabled teaching learning methodology has facilitated the attainment of POs and COs. The implementation of Learning Management Systems such as Moodle and online class rooms facilitate the sharing of e-learning materials, online submissions of assignments and online conduct of internal tests etc.

MA ECONOMICS

Aims and Objectives

The MA in Economics is a uniquely designed programme to develop the next generation of Economists with the theoretical knowledge, and technical skills to perform high quality analyses, while at the same time being grounded in the institutional, developmental and ecological context of contemporary India. The programme is designed to draw upon the expertise already present at the University in the areas of development, policy and governance, and education. The programme will help students develop strong technical economic skills along with contextual understanding of development issues facing India. It is intended for students who want to go into the development sector, public policy and also at students who want to pursue further studies in Development, Economics or Public Policy.

Programme outcome

The programme objective of the MA in Economics is to develop a wide range of skills—the ability to make sense of a complex social reality, a strong aptitude in dealing with abstract numbers and statistics, a sense of the historical context of societies, an understanding of human motivation and a feeling for the moral and ethical underpinnings of social arrangements. The hope for economists is that the knowledge they acquire can be used to help promote a better society.

Calicut University's unique approach is to provide students with a strong understanding of the Indian economy, economic theory, tools of analysis and the ability to practically apply these to current economic and development issues. Upon completion of our programme our goal is to have students of Economics who are socio-politically engaged, quantitatively adept and able to engage in the development sector and provide solutions for pressing problems.

Programme specific outcome

PG programme offers a number of innovative approaches to advancing Economics education. Firstly, students will be exposed to a plurality of schools of thought within economics, which are historically grounded and puts real world issues and problems in the forefront. Secondly, our programme gives precedence to understanding economics through the practical application of its techniques to the Indian economy and development context. Lastly, we employ innovative pedagogical approaches to economics including problem-based learning, flipped classrooms, collaborative learning environments and the use real economic datasets with the economics core curriculum courses.

A MA in Economics will provide students with a number of skills and preparation for entering the world of work. Employers from the public to private and non-profit sector value the knowledge base and skills, both analytical and empirical, that economists acquire. Students who wish to further their studies post-graduation will also be well placed with a strong foundation of economic theory, practice and application to real world phenomenon.

Course outcome

The overarching learning objectives of the MA in Economics can be broken into two main areas – knowledge outcomes and skill acquisition. Our desired outcomes include goals related to knowledge of Indian economic development, economic concepts, development theory, critical thinking skills, quantitative and writing skills for public and academic engagement.

1. Knowledge of economic development within the Indian context
2. Knowledge of development theories and concepts
3. Knowledge of real-world institutions and actors involved in economic development within the Indian context.

4. Skill in communication for public and academic audiences
5. Skill in problem solving and analysis
6. Skill in conducting independent research

MSc Statistics

POST GRADUATE PROGRAM OUTCOMES

PO1	Attain profound Expertise in Discipline
PO2	Acquire Ability to function in multidisciplinary Domains
PO3	Attain ability to exercise Research Intelligence in investigations and Innovations
PO4	Learnt Ethical Principles and be committed to Professional Ethics
PO5	Incorporated Self-directed and Life-long Learning

Program Specific Outcomes

PSO1	Understand and apply mathematical fundamentals of statistcal techniques for data analysis
PSO2	Understand and implement the techniques involved in probability and statistical distributions in real situations
PSO3	Understand and implement statistical sampling and inference techniques I real life situations
PSO4	Carry out stochastic modelling of real life problems
PSO5	Explain and apply the techniques of design and analysis of experiments, statistical quality controland life time data analysis in real life situations
PSO6	Implement the statistical techniques using R/SPSS/Python softwares

COURSE OUTCOMES

FIRST SEMESTER

ANALYTICAL TOOLS FOR STATISTICS – I
Code: MST1C01

CO1	Develop skills in generalizing the concepts in univariate calculus to multivariate setup
CO2	Acquire the basic concepts of complex plane
CO3	Determine derivatives and integrals in the case of functions in the complex plane
CO4	Understand the calculus of residue of complex functions
CO5	Understand different one to one transformation of function and its applications

ANALYTICAL TOOLS FOR STATISTICS – II
Code: MST1C02

CO1	Understand the basics of vector space, subspaces, independence of vectors, basis and dimension, direct sum, complement and orthogonality
CO2	To examine linear independence and to construct orthogonal and orthonormal vectors
CO3	Understand and apply operations on matrices and its properties
CO4	Understand rank and nullity, for analysis of matrices
CO5	Determine eigen values and eigen vectors of the given matrix. Establish the relation between algebraic and geometric multiplicity
CO6	Understand matrices with special structures and their properties
CO7	Understand and execute the decomposition of a matrix
CO8	To understand the solution of homogeneous equations and their applications in real life situations and use of g inverse
CO9	Understand quadratic forms and reduction of quadratic forms and gets ability for solving problems in these areas
CO10	To equip the students with the advanced concepts in linear algebra to perform in Competitive exams like NET, SLET, ISS.

DISTRIBUTION THEORY
Code: MST1C03

CO1	Students will get the knowledge of different types of discrete probability distributions
CO2	Students can study the properties and applications of continuous distributions
CO3	Students can derive probability distributions of the different functions of discrete and continuous random variables
CO4	Students are expected to understand different Sampling distributions and their interrelations
CO5	Will get the practical knowledge of real data modeling using probability distributions

PROBABILITY THEORY
Code: MST1C04

CO1	Students acquire to use algebra of sets in statistics
CO2	Understand necessary knowledge of measure theory
CO3	To understand basic concepts of Random variable in measure point of view
CO4	To understand the concept of distribution function, Characteristic function and their relationships and importance
CO5	To understand different convergence concepts in Statistics

CO6	Students acquire knowledge in some of the very important theorems like WLLN, CLT and its applications

STATISTICAL COMPUTING-I

Code: MST2C05

CO1	Develop scientific and experimental skills of the students
CO2	Apply the principles of linear algebra, Distribution Theory, and analytical tools for statistics using real data sets
CO3	Understand the formulas to be applied for the analysis
CO4	Write the R codes for the analysis of the given data
CO5	Understand how to install and load the packages required to run the R codes
CO6	Understand how the data given for the analysis is to be entered
CO7	Explain how to make conclusions and write the inference for the data analysis based on the output obtained.

SECOND SEMESTER

DESIGN AND ANALYSIS OF EXPERIMENTS

Code: MST2C06

CO1	Understand planning of an experiment
CO2	Discuss and compare different complete block designs with and without ancillary variables
CO3	Analyze experiments with and without missing values.
CO4	Understand and apply incomplete block designs and balanced incomplete block designs
CO5	Understand factorial experiments, total confounding and partial confounding
CO6	Understand Response surface design and method of steepest accent.

ESTIMATION THEORY

Code: MST2C07

CO1	Understand the properties of estimators, unbiasedness, consistency and sufficiency
CO2	Describe the method of finding sufficient statistics, minimum variance unbiased estimators, consistent estimators and consistent and asymptotically normal estimators
CO3	Relate sufficient statistic and ancillary statistic using Basu's thorem
CO4	Determine UMVUE using complete sufficient statistic using the theorems RaoBlackwell, and Lehmann-Scheffe theorem
CO5	Determine the Fisher Information, best linear unbiased minimum variance unbiased estimators.
CO6	Explain pitman family and exponential family of distributions
CO7	Determine the estimators using maximum likelihood method, Bayesian method and consistent estimators using the method of percentiles

CO8	Learn the concept of interval estimation

SAMPLING THEORY
Code: MST2C08

CO1	Understand the basic concepts of sampling theory
CO2	Apply the sampling methods simple random sampling, systematic sampling, stratified sampling and cluster sampling
CO3	Estimate the population parameters for variables and attributes under the above procedures.
CO4	Estimate the population parameters concerning the study variables under auxiliary information (Ratio and regression methods)
CO5	Discuss probability proportional to size (PPS) sampling strategies.
CO6	Explain the concepts of ordered and unordered estimators and its properties
CO7	Discuss the multi stage and multiphase sampling
CO8	Understand non-sampling errors

TESTING OF STATISTICAL HYPOTHESES
Code: MST2C09

CO1	Understand the problem of testing of hypotheses and the concept of p value
CO2	Construct most powerful tests using Neyman-Pearson lemma, one-sided and two-sided UMP tests and UMP unbiased tests.
CO3	Understand concept of α-similar tests and construct such tests
CO4	Apply nonparametric tests for testing goodness of fit, homogeneity and independence
CO5	Understand Sequential Probability Ratio Test.
CO6	Develop SPRT for different problems.

STATISTICAL COMPUTING-II
Code: MST2C10

CO1	Develop scientific and experimental skills of the students
CO2	Apply the principles of Design of experiments, Estimation Theory , Sampling Theory, and Testing of Statistical Hypotheses using real data sets
CO3	Understand the formulas to be applied for the analysis
CO4	Write the R codes for the analysis of the given data
CO5	Understand how to install and load the packages required to run the R codes
CO6	Understand how the data given for the analysis is to be entered
CO7	Explain how to make conclusions and write the inference for the data analysis based on the output obtained.

THIRD SEMESTER

APPLIED REGRESSION ANALYSIS
CODE: MST3C11

CO1	Illustrate the concept of linear regression model
CO2	Estimation and testing the significance of regression parameters and explain properties of estimators
CO3	Check the model adequacy of regression models using residual analysis
CO4	Discuss polynomial, stepwise and non parameteric regression models
CO5	Explain logistic and Poisson regression models for binary and count data and estimate their parameters
CO6	Discuss generalized linear models and estimation of their parameters

STOCHASTIC PROCESSES
CODE: MST3C12

CO1	Recollecting the basic concepts of random variables and conditional probabilities
CO2	Understand the fundamentals of Markov process and classification of states
CO3	Explore inter arrival time and waiting time distributions and their properties
CO4	Understand the generalized Poisson process and their properties
CO5	Understand the concept and applications of renewal process
CO6	Understand the basic characteristics of queues and the properties of Brownian motion

ELECTIVE I-STATISTICAL QUALITY CONTROL
CODE: MST3E10

CO1	Understan the concepts of quality, quality assurance and accptance sampling
CO2	Explain and compare the methods of acceptance sampling sampling for attributes
CO3	Explain acceptance sampling by variables and continuous sampling plans
CO4	Describe and apply the control chart for attributes
CO5	Explain and implement control chart for variables
CO6	Understand process capability analysis and Explain CUSUM and EWMA control charts.

ELECTIVE II-: TIME SERIES ANALYSIS
CODE: MST3E02

CO1	Understand the basics of time series data, its auto-covariance, auto-correlation and stationarity
CO2	Illustrate test for trend and seasonality
CO3	Explain the smoothing methods for determining trend of the data.
CO4	Learn the properties of linear time series models
CO5	Fit linear models for time series data sets

CO6	Describe the maximum likelihood, Yule-Walker and least square estimation methods
CO7	Learn to validate a model using residual analysis
CO8	Understand ARCH and GARCH models and their properties
CO9	Analyse spectral density and periodogram

STATISTICAL COMPUTING-III
CODE: MST3C13

CO1	Develop scientific and experimental skills of the students and to correlate the theoretical principles with application based studies
CO2	Learn to apply the statistical techniques using R or Python
CO3	Understand the theoretical results by simulation of artificial data sets using R or Python.
CO4	Learn to import and analyze data from other source of data files like spreadsheet or web page
CO5	Prepare the complex raw data into manageable format to analyze
CO6	Get basic knowledge about the avenues of further improvement of R packages and frontiers of ever growing research on statistical computing

FOURTH SEMESTER

MULTIVARIATE ANALYSIS
CODE: MST4C14

CO1	Understand the concept of multiple variables and their joint probabilistic behaviors
CO2	Understand the development and uses of multivariate normal distribution
CO3	Learn the various characterization properties of multivariate normal distributions
CO4	Get idea about sampling distributions of various multivariate statistics and know how the results are utilized in inference procedure
CO5	Understand the different aspects of testing of statistical hypothesis in multivariate set up
CO6	Identify the most appropriate statistical techniques for a multivariate dataset
CO7	Carry out and apply commonly used multivariate data analysis techniques, and interpret the results

STATISTICAL COMPUTING-IV
CODE: MST4C16

CO1	Develop scientific and experimental skills of the students and to correlate the theoretical principles with application based studies
CO2	Learn to apply the multivariate techniques using R or Python
CO3	Understand the theoretical results by simulation of artificial data sets using R or Python
CO4	Learn to import and analyze multivariate data from other source of data files like spreadsheet or web page

CO5	Understand the different aspects of testing of statistical hypothesis in multivariate set up
CO6	Prepare the complex raw data into manageable format to analyze
CO7	Get basic knowledge about the avenues of further improvement of R packages and frontiers of ever growing research on statistical computing

ELECTIVE-III, Statistical Decision Theory
CODE: MST4E07

CO1	Discuss the need and role of statistical decision theory to solve real decision problems
CO2	Understand various decision principles and associated loss functions
CO3	Able to differentiate between frequentist and Bayesian decision theory
CO4	Understand the prior and posterior distributions
CO5	Learn how to handle prior selection problem
CO6	Prepare the complex raw data into manageable format to analyze
CO7	Learn the development of optimal strategies for actions in competitive situations involving two or more intelligent antagonists
CO7	Understand the general techniques for solving games using game theory

PROJECT/DISSERTATION AND COMPREHENSIVE VIVA-VOCE
CODE: MST4C15

CO1	Discuss the applications of various statistical techniques learned in the entire course in the form of project work
CO2	Able to manage a real practical situation where a statistical analysis is sought
CO3	Able to develop professional approach towards writing and presenting an academic report
CO4	Understand the thrust areas of research on the topic and get more insight about the opportunities in research/career

M.Sc Zoology

PROGRAM OUTCOME

Student will be able to develop knowledge and understanding of living organisms at several levels of biological organization from the cellular through molecular to whole organisms level and at ecosystem level in an evolutionary perspective.

Student will be able to acquire knowledge related to concepts like ecology, evolution, taxonomy, biochemistry, molecular biology etc. and apply the knowledge in new situations.

The student will develop skills in experimental techniques in the subjects of study.

The student will be able to develop scientific way of thinking and scientific attitude pertaining to the concepts in ecology, evolution, taxonomy, biochemistry, molecular biology etc.

PROGRAMME SPECIFIC OUTCOMES (PSOs) .

PO 1 Students gain knowledge and skill in the fundamentals of animal sciences, understands the complex interactions among various living organisms
PO2 – Analyse complex interactions among the various animals of different phyla, their distribution and their relationship with the environment
PO3 – Apply the knowledge of internal structure of cell, its functions in control of various metabolic functions of organisms.
PO4 – Understands the complex evolutionary processes and behaviour of animals
PO5 – Correlates the physiological processes of animals and relationship of organ systems
PO6 – Understanding of environmental conservation processes and its importance, pollution control and biodiversity and protection of endangered species
PO7 – Gain knowledge of Agro based Small Scale industries like sericulture, fish farming, butterfly farming and vermicompost preparation.
PO8 – Understands about various concepts of Immunology, Genetics , Cell biology and Biochemistry and its importance in human health
PO9 - Apply ethical principles and commit to professional ethics and responsibilities in delivering his duties
PO10 – Apply the knowledge and understanding of Zoology to one's own life and work
PO11 – Develops empathy and love towards the animals

ZOL1C01 - BIOCHEMISTRY AND CYTOGENETICS

COURSE OUTCOMES [COs]

CO1. The student will describe the importance of various chemical interactions in the biological system
CO2. The Student develops the abilty to analyze the structure, classification, and biochemical properties of carbohydrates from other organic molecules
CO3. The student develops the ability to describe classification, structural organization, and purification techniques of proteins.
CO4. The student acquire knowledge regarding the classification and functions of lipids and fatty acids
CO5. The student develops appreciation on the mechanisms of enzyme action, inhibition, and acquire knowledge regarding classification of enzymes that facilitate the functioning of enzymes
CO6. The student develops appreciation on Watson and Crick model of DNA
CO7. The student will explore various anabolic and catabolic pathways of biomolecules such as glucose, nucleic acids, amino acids and lipids.
CO8. The student develops a conceptual knowledge regarding the principles of energetics in biological systems.
CO9. The student acquire knowledge about the structure and functions of Cellular components, plasma membrane and its models, membrane transport mechanisms and properties , cytoskeletal elements and Intracellular trafficking.
CO10. The student gain knowledge of Chromatin structure and chromosomal alterations, Interrupted genes, gene families and extra chromosomal inheritance.
CO11. The student explore and appreciate the importance of cellular adhesion molecules, cell-cell and cell - matrix interactions, intercellular communications along with noted signal transduction pathways and intracellular signaling mechanisms and their significance.
CO12. The student will describe the process and significance of necrosis and apoptosis and, its regulation in the cellular level

ZOL1C02 - BIOPHYSICS AND BIOSTATISTICS

Course outcomes (COs)

CO 1	The student develops conceptual knowledge regarding the basic principles of physics involved in biological processes.
CO 2	The student appreciate the biological aspects and implications of sound energy
CO 3	The student will be able to differentiate various ionizing radiations and to understand a comparative account of their biological effects.
CO 4	The student may familiarize with various biophysical and electrophysiological methods
CO 5	The student gain conceptual knowledge on the principles of microscopy and apply

CO 6	The student explore the possibilities of the applications of separation techniques.
CO 7	The student will describe gravity 'G' force and its multi-faceted applications.
CO 8	The student will explore and appreciate nano technology as a highly promising arena in biological investigations
CO 9	The student skills in various methods of data collection, tabulation and presentation of data for biological research
CO 10	The student develops ability to apply measures of central tendency and dispersion in biological research, and various types of probability distribution.
CO 11	The student analyze and apply parametric and non parametric tests and its applications in biological research
CO 12	The student learn how to apply different types of ecological indexes in biological research

ZOL1C03 - ECOLOGY AND ETHOLOGY

Course outcomes (COs)

CO 1	The student develops ability to differentiate between the concepts of Habitat, Niche
CO 2	The student explain the concepts of, Ecosystem energetic sand Mineral cycling.
CO 3	The student learn to appreciate nature's way to maximize efficiency in utilization of energy and resources; to reduce competition.
CO 4	The student will be able describe the characteristics of population growth and species interaction.
CO 5	The student will explain the components of Ecological community, the process of Ecological succession, Biomes etc.
CO 6	The student will appreciate the complexity of relationship between organisms.
CO 7	The student will be able to describe the characteristics of various biogeographically realms, and Indian biodiversity.
CO 8	The student will be able to give explanation to the differential distribution of organisms across the world.

CO 9	The student will describe the characteristics of various biogeographically realms, and Indian biodiversity
CO 10	The student will explain the concept of Carbon credit, Carbon trading etc.
CO 11	The student will learn to analyse various aspects of Green building technology and interlinking of rivers.
CO 12	The student learn to appreciate the richness of Indian biodiversity and various strategies of Wildlife conservation
CO 13	The student will be able to describe the components of animal behaviour, factors of motivation and conflict behaviour, properties of instinctive behaviour, types of learning, adaptiveness of behaviour, importance of biological rhythms and parental care, influence of hormones on behaviour.
CO 14	The student develops appreciation about the importance of nature watch and field study.

ZOL2C04 - PHYSIOLOGY

Course outcomes (Cos)

CO1. The student create an awareness among the society to promote balanced lifestyle and improve people's diet
CO2. The student will be able to explain the role of nutrition in health
CO3. Discuss the physiology of various organ systems in the body
CO4. The student will be able to differentiate the structure and functions of various organs in the human body
CO5. The student will describe different functional areas of cerebral cortex
CO6. The student will describe the cardiac cycle
CO7. The student will be able to discuss the physiology and mechanisms of respiration
CO8. The student will Identify and define neuro-anatomical structures
CO9. The student will summarize the various neurological disorders
CO10. Discuss different types of excretory organs in different animal groups
CO11. Explain the role of excretory system in the regulation of water balance, ,acid base balance and electrolyte balance
CO12. Identify the symptoms of life style diseases and suggest ways to control them
CO13. Explain the environment's influence on the physiological function and performance of living organisms

ZOL2C05 - MOLECULAR BIOLOGY

Course outcomes

CO1. The student will acquire knowledge regarding the mechanism of DNA replication- both chromosomal and extra chromosomal, enzymes involved, models of replication, inhibitors and the significance of DNA replication.
CO2. The student learn to know the safeguard systems of DNA, restriction enzymes and their significance, mechanisms involved in damage and repair of eukaryotic DNA and its importance.
CO3. Learn to explain the general features of genetic code, special features of the genetic code in mitochondria, and variations in genetic code.
CO4. The student gain in-depth knowledge regarding the structural organization of mRNA in prokaryotes and eukaryotes, the mechanism of transcription, translation, post transcriptional and translational modifications, structure , biogenesis and role of ribosomes in protein synthesis ; and RNA editing.
CO5. The student will gain knowledge regarding the regulation of gene expression in Phages, Bacteria, and in Eukaryotes ; recent research findings like antisense RNA strategies and role of si RNA and mi RNA in the regulation of eukaryotic gene expression and their applications.
CO6. The components , organization and special features of eukaryotic genome, interrupted genes and their evolution; concept of gene families, and molecular evolutionary clock.
CO7. Introduction to transposition mechanisms in prokaryotes and eukaryotes , and their significance.
CO8. Molecular mechanisms of genetic recombination,models, and significance.
CO9. Special features of microbial genetics, and organelle genome, their replication and mapping.
CO10. The student gain an in depth knowledge regarding the events and regulation of cell cycle, its alteration and causes of cancer. Genes involved in the regulation of cancer and modern therapeutic interventions like immunotherapy and gene therapy.

ZOL2C06 - SYSTEMATICS AND EVOLUTION

Course outcomes (Cos)

CO1. The student develops skills in the identification and taxonomic classification of organisms
based on their characters
CO2. The student will be able to describe different levels of taxonomy
CO3. Aware about Place, importance, applications and goals of taxonomy
CO4. Learn about purpose of classification, use of classification, theories of biological classification and types classification

CO5. Explain taxonomic procedures like Taxonomic collections,Curation, Recording of field data, storage of collection, labelling and cataloguing of collection Identification- methods of identification, Use of keys,Taxonomic descriptions, Taxonomic and ecological publication and their difference.
CO6. The student will acquire knowledge regarding Species concept and the taxonomic diversity within species, different kinds of species, sub species and other infra specific categories, hybrids
CO7.Recognize the importance of Zoological nomenclature, International Code of Zoological Nomenclature
CO8. Interpret Principle of priority, Homonymy and Synonymy and Different kinds of types in descriptive taxonomy
CO9. Use new trends in Systematics especially Chemo and Serotaxonomy, Cytotaxonomy, Numerical taxonomy, Cladistics, Molecular systematics and DNA bar coding vs traditional taxonomy
CO10. Recognize the ethics related to taxonomic collections and publication
CO11. Realize the taxonomic impediments
CO12. Describe the mechanism of natural selection and the evolutionary mechanisms
CO13. Explain tempo of evolution
CO14.Describe molecular evolutionary theories like Neutral theory of molecular evolution, Molecular clocks- genetic equidistance- human mitochondrial molecular clock and Phylogenetic relationships
CO15. Recognize Evolutionary trends in Biochemical evolution and primates evolution
CO16 .An enhanced knowledge about the Mechanism of natural selection –
CO17. The student develops conceptual understanding on Hardy-Weinberg law, founder principle, bottleneck effect and genetic drift, process of Isolating mechanisms- Prezygotic and Postzygotic isolating mechanisms; speciation-allopatric, peripartric-parapatric-heteropatric- sympatric speciation; ecotypes etc.
CO18. The student develops appreciation about the major processess involved in the Co-evolution; Microevolution, Macroevolution etc.
CO19. The process involved in the Gradualism and punctuated equilibrium along with anagenesis and cladogenesis will be acquired
CO20. An enhanced level of conceptual learning regarding Neutral theory of molecular evolution; molecular divergence; molecular drive, Molecular clocks- genetic equidistance- human mitochondrial molecular clock , Phylogenetic relationships- DNA barcoding vs traditional taxonomy etc
CO21. An elevated understanding of the Biochemical evolution- Collapse of Orthogenesis along with Stages in primate evolution ; African origin for modern humans, Y-chromosomal Adam- mitochondrial Eve, the process of Communication, speech, language and self awareness in Primates etc.

ZOL3C07 – IMMUNOLOGY

Course outcomes

CO1. An in depth knowledge in the process of immune cell synthesis and maturation, antigen receptor structure and the mechanisms of antigen recognition by B-cell and T-cells.
CO2. The student will explore the Structure and diversity of immunoglobulins, antigens and its classification, production and clinical uses of monoclonal antibodies and antigen antibody interactions.
CO3. The student gain conceptual knowledge regarding key principles, procedure and applications of different Immunetechniques used in the biomedical field and to develop new methods and techniques on the basis of the earned knowledge.
CO4. Mechanisms of humoral and cellular immunity, immune cell receptor and intracellular signal cascades related to immune system activation and response.
CO5. The student explore the fundamentals of Immune effector mechanisms, chemical signaling through cytokines, its therapeutic uses and cytokine related diseases.
CO6. The complement system and its components, hypersensitivity and allergic responses, diseases related to hypersensitivity, autoimmune disorders and complement deregulation.
CO7. The student will appreciate the scientific principles behind vaccination, types of vaccines and their role in fighting diseases.
CO8. The student will be able to describe the mechanisms of autoimmunity and immune deficiency diseases.

ZOL3C08–DEVELOPMENTAL BIOLOGY & ENDOCRINOLOGY

Course outcomes

CO1: The student will gain knowledge onbasic concepts in development.
CO2: The student will explain the process of gametogenesis, fertilization and embryonic development.
CO3: The student will appreciate the genetic, cellular and molecular basis of development.
CO4: The student will describe the process of ageing and mechanisms.
CO5: The student realize the impact of environment on development.
CO6: Describe different classes of chemical messengers and their physical characteristics.
CO7. Explain how the secretion of hormone is regulated through positive and negative feedback mechanisms.

CO8: Summarize the anatomy, regulation, and physiological functions of the hormones of the hypophysis, thyroid, parathyroid, pancreas adrenal, hypothalamus and adrenal glands.
CO9: Describe the anatomy of male and female reproductive systems including hormonal functions and pathophysiology.

ELECTIVE COURSE- ENTOMOLOGY-I

ZOL3E0901 -MORPHOLOGY AND TAXONOMY

Course outcomes

CO1. The student will explain how insects originated and evolved on earth.
CO2. The student gain knowledge regarding fossil insects.
CO3. The student will be able to describe diversity, systematics , biology and habits of insects.
CO4. The student will explore the external morphology of insects.
CO5. The student will appreciate the behavior and ecology of insects.

ZOL4C10-BIOTECHNOLOGY&MICROBIOLOGY

Course Outcomes (COs)

CO1. The student learn the features of various types of cloning vectors
CO2. The student explore different steps involved in molecular cloning
CO3. The student will describe the techniques involved in the production of molecular probes, Genomic and CDNA library
CO4. The student evaluate and compare various types of PCR techniques
CO5. The student will analyze techniques involved in isolation, sequencing and synthesis of genes
CO6. The student explore and appreciate the applications of biotechnology in animal health care, agriculture and environmental protection.
CO7. The student get falimial with the biotechnological techniques involved in animal cell tissue culture, gene silencing and cloning.
CO8. The student ethical and social implications of biotechnology
CO9. The student understand taxonomy, structure, nutrition, growth of various microbes
CO10. The student analyze various types of microbial diseases and its control measures,
CO11. The student appreciates beneficial effects of microbes.

ELECTIVE COURSE- ENTOMOLOGY–II ZOL4E1101- ANATOMY AND PHYSIOLOGY

Course outcomes

CO1. The student explore the physiological systems of insects.
CO2. The student gain ability to explain the anatomy of insects.

CO3. The student compare embryonic and post embryonic development of insects.
CO4. The student explore various methods of locomotion of insects.
CO 5. The student explore physiology and biochemistry of insects through different laboratory experiments.
CO 6 The student gain hands on experience on the preparation of taxonomic keys, enabling to identify and classify insects.
CO7. The student explore diversity of insects in their natural habitat by various field visits.

ELECTIVE COURSE-ENTOMOLOGY-III

ZOL4E1201- AGRICULTURAL, MEDICAL & FORENSICENTOMOLOGY

Course outcomes (COs)

CO1. The student explore insect pests and types of damage done by insects to plants , pest surveillance and forecasting of pest outbreak.
CO2. The student identify and evaluate insect pests attacking agricultural crops, their biology,
damage , and control measures.
CO3. The student will appreciate Concepts of Economic levels.
CO4. The student explore insect vectors of human diseases and their control.
CO5. The student learn about the principles of insects pest management including
ecological based pest management and chemical control.
CO6. The student gain skills in various equipments for insecticide application.
CO7. The student evaluate the use of insecticides and its impact on wild life and human health
and insecticide resistance.

B.A.Tamil

Programme Specific Outcomes (PSO)

B.A.Tamil Language and Literature

PSO1 Increase Knowledge in Ancient,Medieval, Later Midieval and Modern Literature in Tamil Language .Enhance skills and attitudes for becoming a better learner, thinker, and a human being by learning Literature in Tamil.

PSO2 DevelopeskillinGrammar Through the study of Nannool Ezhuthu& Chol andapplyits grammatical rulesto Contemporary Tamillanguage.

PSO3 Articulate and exemplify basic knowledge of literary theories and its inevitability to interpret literary text. Ability to apply the literary theories to the modern literary texts and interpret accordingly.

PSO4 Apply the Modern Linguistic theories in Tamil language

and differentiate Phonology,Morphology,Syntax,and Semantic structures

PSO5 Acquire knowledge on fundamentals and sub divisions of Agattinai, Purattinai, Thinai, Thurai and Agam PuramRelations.

PSO6 Acquire the knowledge to Compare the Literature of Tamil with the Literature of other languages, Arts and Culture. Acquire knowledge on different kinds of criticism like Historical, Comparative, Modernistic, Marxist, Post modernistic, Feministic, Environmental Criticism etc.

SO7 Acquire Skill in various techniques of writing Poetry and Critical essays

PSO 8 Enhance skills and attitudes for becoming a better learner, thinker, and human being by understanding the ancient and modern ethical Tamil Literature.

PSO 9 Ability to Speak, write and Translate from Tamil to Malayalam and English and also understand the history of Tamil Literature.

PSO10 Acquire Skill in Folk Literature and understand the different kinds of performing folkarts and Tamil Ethnography

PSO11 Acquire Knowledge on Journalism, Electronic media, Types of news reporting,TypesbroadcastingandSocialmedia .

PSO 12 Ability to Speak,write, Translate from Tamil to Malayalam and English and also understand the history of Tamil Literature.

Semester – I
Common Course –1
Paper Code: TML 01 A07 B.A./ B.Sc.
Ikkaala Ilakkiyam

Course Outcomes

CO 1 Identify different literary genres of modern Tamil literature.
CO 2 Enhance the Knowledge of Critical Thinking on modern literature
CO 3 Develop the knowledge in contemporary issues in to the literature
CO 4 Understand the Literary History of Modern Tamil
CO5 Ability to write reviews and criticism on contemporary literature for journals and magazines
CO 6 Develop the Knowledge in Tamil Sol Ilakkanam

Core Course
Paper Code: TML 1B01
Naveena Tamil Urainadai

Course Outcomes

CO 1 Identify different literary genres in modern Tamil Prose literature ie, Novel, Short Story, Biography and Critical Essays

CO 2 Enhance the Knowledge of Critical Thinking on modern literature
CO 3 Develop the knowledge in contemporary issues in to the literature
CO 4 Ability to write reviews and criticism on contemporary literature for journals and magazines
CO 5 Knowing many contemporary literary Personalities

Complementary Course – 1
Paper Code: TML01- C01
Thamizhaka Varalaarum Panpaadum I

Course outcomes:
CO 1 Understand the peculiarities of Tamil / Dravidian race of South India and its historical developments
CO2 Learn about Tamil Language, literature, script and Sangam Literature
CO3 Understand the ancient Tamil social life and system of kingdom
CO4 Acquire the knowledge in the Socio historical developments during AD 2 AD 6
CO 5 Understand the impact Pallava Reign in Tamilnadu
CO 6 Learn about Chola Empire and it impacts in Various Socio Political Factors

Paper Code: TML01-E01

1. Environment studies (Self study) -Audit course-I

Course Ou tComes
CO1 Aware of Environmental Policy
CO 2 Analyze factors cause to Environmental issues
CO 3 Enlighten the self and othes in protect Environment

Semester – I
Common Course – I – B.Com
Paper Code: TML 01- A07
Naveena Ilakkiyam – I

Course Outcomes
CO 1 Identify different literary genres of modern Tamil literature.
CO 2 Enhance the Knowledge of Critical Thinking on modern literature
CO 3 Develop the knowledge in contemporary issues in to the literature
CO 4 Enhance the ability in Translation
CO5 Ability to write reviews and criticism on contemporary social issues
CO 6 To know types and style of modern prose writing
CO 7 Articulate and exemplify about types of phrases, questions and answers, some elements of prosody and figure of speech.

Semester – I
Common Course – 1 – (B.Sc. Electronics/ B.Sc. Computer Science/B.C.A. Non Conventional)
Paper Code: TML 01- A07
Tamil Ilakkiyam – 1

Course Outcomes

CO 1 Identify different literary genres of modern Tamil literature ie., poetry and short stories
CO 2 Enhance the Knowledge of Critical Thinking on modern literature
CO 3 Develop the knowledge of Science Fiction in Tamil
CO 4 Ability to write reviews and criticism on social Issues
CO 5 Develop the ability to translate from English to Tamil
CO 6 Acquire fair knowledge in Tami morphological elements

Semester – II
Common Course – 2 – (B.A./ B.Sc.)
Paper Code: TML 02- A08
Thakaval Thodarpaadal Thiran

Course Outcomes

Course Outcomes

CO 1 Identify different literary genres of modern Tamil literature.ie.,Poetry, Novel
CO 2 Acquire the Knowledge in heritage of Tamil poetry and introduce poetic personalities
CO 3 Develop the knowledge in contemporary issues in to the literature
CO 4 Understand the Literary History of Medieval Tamil literature,
CO5 Learn about Various Style of Prose Writings of various authors
CO 6 Acquire the Knowledge write and read fairly

Semester – II
Core Course – 2
Paper Code: TML 02- B02
Naveena Tamil-Kavithai

Course Outcomes

CO 1 Identify different trends in modern Tamil poetical literature.
CO 2 Enhance the Knowledge of Critical Thinking on modern literature
CO 3 Develop the knowledge in contemporary issues of the modern Tamil literature
CO 4 Introducing Modern Tamil Poetical Personalities
CO5 Ability to write reviews and criticism on contemporary literature for journals and magazines
CO6 Understand the style of Modern Poetry Writing
CO7 Analyze Various factors of modern potry

Semester – II
Complementary Course – 2
Paper Code: TML 02- C02
Thamizhiyal I – Tholliyal

Course Outcomes

CO1 Acquire the knowledge of Archeology
CO2 Understand the types of Archeology
CO3 Learn about ancient Tamil Language and Art evidence
CO4 Ability to identify Archeological Documents of Nadukarkal, Nanayankal Seppetukal and temples

Semester – II
Paper Code: TML02-E02

2.Disaster management(Self Study) **Audit course II**

Course Out Comes

CO 1 Aware of different Types of disaters facing by mankind
CO 2 Implementing Various skills to rescue from disasters accordingly

Semester – II
Common Course – 2 (B.Com/BBA)
Paper Code: TML 02- A08
Naveena Ilakkiyam - II

Course Outcomes
CO 1 Learn about Tamil poetical heritage and traditions
CO 2 Introduce Tamil Poetic Personalities
CO 3 Understand form and wring style of novels
CO 4 Developing the skills in writing Business letters and advertisements
CO 5 Acquire knowledge in various grammatical factors in Tamil

Semester – II
Common Course – 2 (B.Sc. Electronics, B.Sc. Computer Science, B.C.A., Non Conventional)
Paper Code: TML 02- A08
Tamil Ilakkiyam – II

Course Outcomes
CO 1 Acquire knowledge in various types of Tamil Literature
CO 2 Understand the social nature of Sangamliterature
CO 3 Learn Tamil Didactic Literature
CO 4 Knowing Tamil Science Fictions and its nature
CO 5 Understand Types of Tamil Drama & Learn Tamil Drama
CO 6 Understand some grammatical factors of Tamil Language

Semester – III
Common Course – 3 (B.A./ B.Sc.)
Paper Code: TML 03 A09
Mozhi Alumaithiran

Course Outcomes

CO 1 Acquiring various types of Language skills
CO 2 Learn about the literary history of Tamil Epical Literature
CO 3 Introduce to poems of other languages.
CO 4 To Develop Translation skills
CO 5 To develop comparative critical sense
CO 6 Understand various types of Tamil Figure of Speech

Course Outcomes

CO 1 : Understand the nature of Tamil Bakthi / Spiritual literature of Saivaite and Vaishnavite poetics
CO 2 : Acquire the knowledge in Tamil Epic Literature
CO3 : Acquire the knowledge in Tamil Minor Literature
CO 4 : Understand the genres and Character of Later Tamil Poetries
CO 5 : Aware the contributions of Christian and Islamic Poets to Tamil language and Literature

Semester – III
Core Course – 4
Paper Code: TML03 B04
Ilakkanam Nannool – Ezuthu

Course Outcomes:

CO1: Understand the Nannool Ezhuthu in its Historical perspectives.

CO2: Articulate and exemplify basic knowledge of Tamil Ezhuthu ,Phonemics, Phonetics & Morpho phonemics level.

CO3: Acquire knowledge on Punarchi and its rules, to read the old Tamil texts dissolving Punarchi rules with ease.

CO4: Ability to identify the 'punarchi rules in Contemporary Tamil.

Semester – III
Complementary Course – 3
Paper Code: TML 03-C03
Thamizhiyal II Agaraathiyiyal

Course Outcome

CO 1 Understanding the long history and developments of Tamil Lexicography
CO 2 Knowing Types and kinds of Tamil Lexical works
CO 3 Analyze Tamil Lexical Works
CO 4 Compare with lexical works in other languages
CO 5 Evaluate the usages of Various types Lexicons
CO 6 Aware the nature reference materials ie., Dictionaries, Lexicons, Encyclopedias

Semester – III
Paper Code: TML03-E03
Audit Course III

Human Rights/ Intellectual Property Rights/ Consumer Protection (Self Study)

Course Out Comes
CO 1 Understand about varius human rights and its social importance
CO 2 Creating an awareness on Intellectual Property rights and Consumer Protection

Semester IV
Paper Code : TML 04-A10 (B.A./B. Sc.)
Common Course-04
Panpaadum Nagarikamum

Course Outcomes

CO1 Learn about literary history of ancient Tamil Literature and its categories
CO 2 Under stand Cultural and literary value of Ancient Tamil literature with the Study of Various Literary Portions
CO 3 Analyze Cultural Documentations of Oral / Folk Literature
CO 4 Understand the cultural Transmissions and its social forces
CO 5 Learn Tamil Porul Ilakkam and compare its importance through Ancient Tamil poems

Semester – IV
Core Course – 5
Paper Code: TML 04- B05
Pandaya Ilakkiyam

Course Outcomes

CO1 Learn about ancient literature and its literary peculiarities
CO2Understanding of Tamil Akam Puram Literary traditions
CO 3 Acquire Knowledge in Tamil Didactic Literature and its impact in human behaviours
CO4 Idendify and Categorize Ancient Tamil Literary generes by content, form and other many ways
CO5 Analyze Socio Cultural imprints in Ancint Literature.

Semester – IV
Core Course – 6
Paper Code: TML 4- B06
Ilakkanam Nannool – Choll

Course Outcomes

CO 1 Learn Nannool Chol with its linguistical importance
CO 2 Understand various elements of Tamil Choll Ilakkanam
CO 3 Articulateand Exemplify various grammatical forms
CO 4 Analyze Nannool Chol Ilakkanam

CO 5 Compare Nannool Grammatical Treaties with Contemporary Tamil Usages

Semester – IV
Complementary Course – 4
Paper Code: TML 04- C04
Thamizhaka Varalaarum Panpaadum II

Course Outcomes
CO1 Acquire fair knowledge in history and culture of Tamilnadu
CO2 Aware of the interplays of history and Culture
CO3 Evaluate later developments in history of Tamilnadu
CO4 Ability to Criticize and Evaluate the Contemporary Socio Political Issues
CO5 Idendify role of social currents in making of history

Semester – IV
Paper Code: TML04-E04
Audit Course 4
Gender studies/Gerontology (Self Study)

Course Outcomes
CO 1 Understanding the issues in Gerentology
CO 2 Analyse the issues of Gerentology
CO 3 Idendify the various problems rising in connection with Aging

Semester – V
Core Course – 7
Paper Code: TML 05-B07
Naattar Vazhakkatriyal

Course Outcomes

CO 1 Aware of Oral / Folkloric Heritage and its importance as cultural document.
CO 2 Understand various theories and glossaries used in folklore
CO3 Learn about Tamil Folklore, its factors, types, kinds, content and forms.
CO 4 Interpret folklore as Source of history, culture, and expressin of individual and social
CO 5 Evaluate the social and cultural life styles of a mankind by folklore

Semester – V
Core Course – 8
Paper Code: TML 05-B08
Ilakkanam Porul-Akam,Puram

Course Outcomes

CO 1 Understanding Tamil Akam Puram Literary Tarditions
CO2 Learn Nambi Akapporul and Purapporul Venbamalai
CO3 Aware of various Akam Puram literary Theories and Strategies

CO4 Analyze the theroiesand exemplify suitably from vast Tamil literature
CO5 Evaluate the theories and criticise with contemporary literature

Semester – V
Core Course – 9
Paper Code: TML 05-B09
MozhiIyal

Course Outcomes
CO 1: Understand the evolution and development of the language through various stages andPeriods.

CO2:Identifythephoneticscripts and InternationalphoneticChart

CO 3Learn various linguistic Theories ans and its application

CO 4 :Applying Nida and Chomsky's definition oflanguages

CO5:DifferentiatePhonology,MorphologyandSyntax,

Semantic structures of language

Semester – V

Core Course – 10
Paper Code: TML 05-B10
Puthumurai Ilakkiyaviyal

Course Outcomes

CO 1 Understand new literary trends and literary perspecives
CO 2 Learn new literary crical theories and approach
CO 3 Aware of Post modern literary conditions, its content and forms and narrative strategies
CO 4 Analyze Feminism Dalitism and subaltern Subjectives in literature

Semester -V
Open course
Paper Code: TML 05 – D01
Tamil Mozhi Katral

Course Outcomes
CO 1 Introduce Tamil language and its specialities
C0 2 Learn Tamil Ezhuthu, types and kinds of lettrs and its various funtions
CO 3 Understand different usages of language according to context
CO 4 Aware of Tamil Malayalam languages in comparive manner
CO 5 Skill of reading writing and speaking and conversation.

Semester – VI
Core Course – 11
Paper Code: TML 06 -B11
Dravida Mozhikalin Oppilakkanam

Course Outcomes
CO 1 : Aware of Dravidian language and its familes

CO 2: Uunderstand the evolution and development of theDravidian language through various stages andPeriods.

CO 3: Compare Historical and Comparative Linguistics

CO4: DifferentiatePhonology,Morphology and Syntax, Semantic structures of Dravidian lahguages

CO 5 : Understand Cauldwell's contribution to Dravidianlanguages

CO 6 : Idendify changes occurred in Tamil and Dravidian Languages

Semester – VI
Core Course – 12
Paper Code: TML 06 -B12
Ilakkanam-Yaappum Aniyum

Course Outcomes

CO 1 Understand Tamil Prosody and Figure of Speech and its evolution
CO 2 Learn Yapparunkalak Karikai and Dandi Alankaram Texts
CO 3 Applying rules of Prosody and Figure of Speech in literature study
CO 4 Familiarize with various Figure of Speeches with contemporary Tamil poetics
CO 5 Creating poems according to Tamil prosodic rules

Semester – VI
Core Course – 13
Paper Code: TML 06-B13
Ilakkiyath Thiranaayvu

Course Outcomes:
CO1: Aware of basic knowledge of literary theories and its inevitability to interpret a literary text.
CO2: Acquire knowledge on Various Literary genre
CO3: Ability to identify the 'Structure of various literary genre
CO4: Understand the Tamil Tradition of Criticism and Commentary
CO5: Acquire knowledge to identify a literary theory by its central Concept

Semester – VI
Core Course – 14
Paper Code: TML 06-B14
Oppilakkiyam

Course Outcomes

CO 1: Compare one literature with another
CO 2: Understand the various types of literatures of the world
CO 3: Learn the theories, practices and uses of comparative literature in general
CO 4: Understand and analyze the principles, style and narrative techniques of the Tamil
CO 5: Evaluate features of National and International Literature
CO 6: Learn to evaluate the writings of Tamil poets in contrast with authors of other languages.

Semester – VI

Core Course (Elective-1)
TML 06-B15 Alaiviyal

Course outcomes

CO1 Familiarise with Tamil Diaspora Literaure and its Writers
CO2 Identify Various themes and writing styles of Diaspora Literature
CO3 Learn Various kinds of Diaspora Literaure ie., poems stories novels and biographies
CO4 Evaluating span of Tamil literature through Tamil Diaspora Literaure
CO 5 Aware of the historical background of Tamil Diaspora literature.

Semester – VI
Core Course (Elective-2)
TML 06-B16 Naadagaviyal

Course Outcomes
CO1 Acquiring knowledge about history of Tamil Dramaturgy
CO2 Idendify Various types of Tamil Drama and Theteres
CO3 Critical study of Tamil Drmatic texts
CO4 Aware of various factors of a Drama
CO5 Applying drama as a learning strategy in education

Semester – VI
Core Course (Elective-3)
TML 06-B17 Bharathi Iyam

Course Outcomes
CO1 Understanding Importance of Bharathi's Writings with historical perspective
CO2 Familiarize with Bharathi's Life , Creative Works, and his multi personalities
CO 3 Evaluate contributions of Bharathi in the formation of Tamil Modernity
CO 4 Criticize and analyse Bharathi and his Idealogies and writings
CO 5 Compare Bharathi's poetical works with national and international Poetry.

Semester – VI
Core Course
Paper Code: TML B (PR)
Project Work

Course Outcomes
CO 1 Aware the fields of Tamil Research
CO 2 Understand about doing a project
CO 3 Knowing the Structure and form of a project Work
CO 4 Applying the gathered experience to complete the project perfectly in all steps
CO 5 Familiarize with best pioneer studies in the subject

MATHEMATICS

BSc MATHEMATICS ;

The program develops logical thinking, mathematical skills and knowledge for their intrinsic beauty, effectiveness in developing proficiency in analytical reasoning, and utility in modeling and solving real world problems. To responsibly live within and participate in the transformation of a rapidly changing, complex, and interdependent society, students must develop and unceasingly exercise their analytical abilities. Students who have learned to logically question assertions, recognize patterns, and distinguish the essential and irrelevant aspects of problems can think deeply and precisely, nurture the products of their imagination to fruition in reality, and share their ideas and insights while seeking and benefiting from the knowledge and insights of others.

Students majoring in Mathematics attain proficiency in

Critical thinking: Think critically and communicate clearly mathematical concepts and solutions to real world problems. Develop an understanding of the precise language of Mathematics, and be able to integrate mathematical arguments with their critical thinking skills

Problem solving: Be able to solve problems using a broad range of significant mathematical techniques. recognize real-world problems that are amenable to mathematical analysis, and formulate mathematical models of such problems.

Effective communication: Develop effective communication skills in English and regional / national language. Students will be able to explain fundamental mathematical concepts or analyses of real-world problems to non-mathematicians and present mathematics clearly and precisely to an audience of peers and faculty

MAT1B01 Foundations of mathematics

1. Course Outcomes

As a course in Mathematics, students be able to:

- Acquires Fundamental Basics of Set Theory
- Learn the set theoretic notations and operations and its vein diagrams
- Get access to the Boolean Algebra its notations and truth table presentations
- Formulate Logical statements and Proofs of Mathematical ideas
- Witness the practical situations where use the ideas of logic and number theory
- Learn different type of functions

2.Program Specific Outcomes

Upon completion of this course, students should be able to:

- Understand the basic theory of sets, relations and functions
- Solve practical problems using set theory and logic
- Construct proofs of mathematical ideas by different ways
- Get used with the mathematical symbols
- Explain why mathematical thinking is valuable in daily life.

MAT2B02: CALCULUS

1. Course Outcomes

As a course in Mathematics, students be able to:

- Describe the concepts and applications of derivatives and higher order derivatives
- Acquires the concept of asymptotes and envelopes
- Understand application of integration
- Apply the techniques of double and triple integral to various problems of finding length of plane curves, surface areas and volumes of surfaces of revolution
- Get access to know application of mathematics in physics

2.Program Specific Outcomes

Upon completion of this course, students should be able to:

- Find Critical points ,concavity and nature of the function
- Sketch graph of a function
- Understand the ideas of double and triple integrals and their applications in finding the lengths, areas and volumes of irregular objects
- Solving and model applied problems
- Solve practical problems in physics using mathematics

MAT3B03: CALCULUS AND ANALYTIC GEOMETRY

1. Course Outcomes

As a course in Mathematics, students be able to:

- Acquire knowledge of logarithmic functions and exponential functions and its applications
- Expand functions using Taylor's and Maclaurin's series, Leibnitz theorem and use their applications
- Learn L'Hospital rule and Hyperbolic functions
- Understand the concepts of sequence, series, convergence and difference tests for convergence related to series and sequence
- Acquire knowledge of conic sections and polar co-ordinates

2.Program Specific Outcomes

Upon completion of this course, students should be able to:

- Apply Taylor's and Maclaurin's series, Leibnitz theorem for finding functions
- Use logarithmic functions and exponential functions on appropriate practical situations
- Solve problems using L'Hospital rule and Hyperbolic functions
- Find limits of sequences and series. Also test the convergence of series by using respective convergence tests
- Understand the ideas of conics and their applications

MAT4B04: THEORY OF EQUATIONS, MATRICES AND VECTOR CALCULUS

1. Course Outcomes

As a course in Mathematics, students be able to:

- Acquires the knowledge of rank of a matrix , characteristic roots and characteristic vectors
- Understands the various applications of the theory of matrices to a wide variety of problems
- Learn Polynomial Equations and Fundamental Theorem of Algebra.
- Apply cylindrical coordinates in practical situations
- Know the basic ideas of theory of equations
- Acquire knowledge of Different methods for solving polynomials
- Get access to different methods for finding inverse of a matrix
- Covert system of equations into matrix and solve it using matrix theory

2.Program Specific Outcomes

Upon completion of this course, students should be able to:

- Find rank of a matrix , characteristic roots and characteristic vectors
- Solve polynomials using different methods
- Use matrix theory in appropriate situations and solve system of equations
- Do practical problems using cylindrical coordinates

MAT5B05: VECTOR CALCULUS

1. Course Outcomes

As a course in Mathematics, students be able to:

- Acquire the knowledge of functions of several variables and their limits, continuity and differentiation
- Develops competency in applying the idea of partial derivatives
- Acquires the basic ideas of double and triple integral
- Acquires the concept of finding partial derivatives and associated rules
- Use the Lagrange multiplier method to find extrema of functions with constraints
- Learn triple integration, greens theorem and divergence theorem and use them to solve practical problems

2.Program Specific Outcomes

Upon completion of this course, students should be able to:

- Solve problems related to functions of several variables
- Applies the knowledge of Lagrange multipliers in finding the extreme values of functions
- Develops skill in finding the partial derivatives of functions of several variables and various rules associated
- Solve double and triple integral problems
- Apply green's theorem and divergence theorem

MAT5B06 : ABSTRACT ALGEBRA

1. Course Outcomes

As a course in Mathematics, students be able to:

- Reveal the beauty and symmetry in nature
- Acquires the basic knowledge of binary operation,Group, Subgroup and Cyclic Groups
- Know the permutation groups and cayley's theorem
- Explains different terms related to algebra
- Learn the different algebraic structures in sets like ring, field and their applications
- Produce rigorous proofs of propositions arising in the context of abstract algebra

2. Program Specific Outcomes

Upon completion of this course, students should be able to:

- Develop abstract way of thinking
- Identify different algebraic structures in different sets and able to prove them
- Apply theorems in algebra wisely to do problems
- Understand the importance of algebra in mathematics

MAT5B07 : BASIC MATHEMATICAL ANALYSIS

1. Course Outcomes

As a course in Mathematics, students be able to:

- Know what is real numbers and its algebraic properties
- Describe fundamental properties of the real numbers that lead to the formal development of real analysis
- Describes the terms sequence, limit, convergence and limit point
- Construct rigorous mathematical proofs of basic results in real analysis
- Learn different theorems on convergence
- Acquire knowledge of complex numbers and their properties

2.Program Specific Outcomes

Upon completion of this course, students should be able to:

- Understand and appreciate the algebraic structures of real numbers
- Solve problems in analysis and complex
- Do mathematical proofs using theorems and propositions in real analysis and complex analysis
- Determine the continuity, differentiability, and integrability of functions defined on subsets of the real line

MAT5B08: DIFFERENTIAL EQUATIONS

1.Course Outcomes
As a course in Mathematics, students be able to:

- Acquire knowledge of first order and second order differential equations
- Learn different methods of solving first order and second order differential equations
- Get acquainted with system of differential equations and their solving methods
- Get the knowledge of Laplace transformations and boundary value problems
- Describe the concepts of Fourier series and its applications
- Find power series solutions of differential equations

2.Program Specific Outcomes

Upon completion of this course, students should be able to:

- Apply the knowledge of differential equations in practical problems
- Solve first order and second order differential equations by using different methods
- Determine solutions of differential equations using Fourier series
- Determine solutions of differential equations using Laplace transformations
- Solve boundary value problems

MAT6B09: REAL ANALYSIS

1.Course Outcomes
As a course in Mathematics, students be able to:

- Explains convergence of a series
- Identifies different tests for convergence of a series
- Explains Continuity and Discontinuity of various functions in different contexts
- Differentiate Uniform continuity from continuity and related theorems
- Acquire the idea about Riemann Integration
- Learn the concepts of convergence of sequence of functions and series of functions
- Learn improper integrals and Beta ,Gamma functions

2. Program Specific Outcomes

Upon completion of this course, students should be able to:

- Solve problems on convergence of series
- Apply the definitions of Continuity and Uniform continuity to explain different properties of functions
- Integrate different functions using Riemann Integration
- Solve problems on convergence of sequence of functions and series of functions
- Solve different Improper integrals
- Use Beta and Gamma functions wisely in practical applications

MAT6B10 : COMPLEX ANALYSIS

1. Course Outcomes
As a course in Mathematics, students be able to:

- Explain the fundamental ideas of Analytic Functions
- Introduce elementary complex functions

- Understand the significance of differentiability for complex functions and be familiar with the Cauchy-Riemann equations
- Discuss basic methods of complex integration
- Understand the basic methods of complex integration and its application in contour integration
- Learn power series and Laurent series expression of complex valued functions
- Learn the concept of singularities and different type of singularities
- Use the Cauchy Residue Theorem to evaluate integrals and sum series

2.Program Specific Outcomes

Upon completion of this course, students should be able to:

- Conceive the concepts of analytic functions and will be familiar with the elementary complex functions and their properties
- Apply the concept and consequences of analyticity and the Cauchy-Riemann equations and of results on harmonic and entire functions including the fundamental theorem of algebra
- Understand the basic methods of complex integration and its application in contour integration.
- Represent functions as Taylor, power and Laurent series, classify singularities and poles, find residues and evaluate complex integrals using the residue theorem
- Use the residue theorem to compute complex line integrals and real integrals

MAT6B11 : NUMERICAL METHODS

1.Course Outcomes
As a course in Mathematics, students be able to:

- Derive appropriate numerical methods to solve algebraic and transcendental equations
- Perform an error analysis for various numerical methods
- Prove results for various numerical root finding methods

- Learn the concept of interpolation and study different methods of interpolation
- Acquire the knowledge of interpolation to solve differential and integration problems
- Learn different methods to solve system of equations and finding the inverse of a matrix
- Learn Numerical Solutions of Ordinary Differential Equations

2.Program Specific Outcomes

Upon completion of this course, students should be able to:

- Solve an algebraic or transcendental equation using an appropriate numerical method
- Solve a linear system of equations using an appropriate numerical method
- Perform an error analysis for a given numerical method
- Verify results for numerical root finding methods
- Apply interpolation methods wisely to solve differential equations
- Apply interpolation methods wisely to integration problems
- Use matrix theory to solve system of equations
- Solve Numerical Solutions of Ordinary Differential Equations

MAT6B12 : NUMBER THEORY AND LINEAR ALGEBRA

1. Course Outcomes

As a course in Mathematics, students be able to:

- Reveal the beauty of numbers and hidden mathematical properties in them
- Learn the concept congruence and Chinese reminder theorem
- Study Fermat's little theorem and pseudoprimes Wilson's theorem.
- Acquire more knowledge about the divisors of numbers
- Learn the concept of vector spaces , basis and dimension
- Study linear transformations and theorem related to them

2.Program Specific Outcomes

Upon completion of this course, students should be able to:

- Get an idea of numbers and their mathematical properties
- Solve system of equations using Chinese reminder theorem
- Solve problems using Fermat's little theorem and pseudoprimes Wilson's theorem.
- Find number of divisors and sum of divisors of each number
- Solve problems related to vector spaces , basis and dimension
- Work with problems related to linear transformations

MAT6B13(E02) : LINEAR PROGRAMMING

1. Course Outcomes
As a course in Mathematics, students be able to:

- Study convex sets and related theorems
- Defines a LPP in standard form and Canonical form
- Identifies a feasible solution, a basic feasible solution and an optimal solution using simplex method
- Understands duality theorems and dual simplex method
- Uses dual simplex method to find optimal solutions
- Explains the Transportation Problem and formulate it as an LPP and hence solve the problem
- Determine that an Assignment Problem is a special case of LPP and hence solve by Hungarian method Identifies

2.Program Specific Outcomes

Upon completion of this course, students should be able to:

- Understand the new term LPP
- Understand Transportation Problem, Assignment problem

- Formulate and model a linear programming problem from a word problem and solve them graphically in 2 and 3 dimensions
- Place a Primal linear programming problem into standard form and use the Simplex Method to solve it
- Understands duality theorems and dual simplex method
- Explains the Transportation Problem and formulate it as an LPP and hence solve the problem
- Determine that an Assignment Problem is a special case of LPP and hence solve by Hungarian method

MAT5D03 : MATHEMATICS FOR SOCIAL SCIENCES

1. Course Outcomes

As a course in Mathematics, students be able to:

- Make students aware of basics of mathematics and its applications
- Learn concepts of graph ,equations and functions
- Acquire knowledge of limit, continuity and differentiation and their applications
- Know different type of functions

2.Program Specific Outcomes

Upon completion of this course, students should be able to:

- Solve problems in graph ,equations and functions
- Apply differentiation in respective problems
- Find logarithm and exponential of numbers

MAT 1C01 : MATHEMATICS

1. Course Outcomes

As a course in Mathematics, students be able to:

- Learn the concepts of limit

- Describe the concepts and applications of derivatives and higher order derivatives
- Acquires the concept of asymptotes and envelopes
- Understand application of integration

- Apply the techniques of double and triple integral to various problems of finding length of plane curves, surface areas and volumes of surfaces of revolution

- Get access to know application of mathematics in physics

2. Program Specific Outcomes

Upon completion of this course, students should be able to:

- Solve problems related to limit

- Find Critical points ,concavity and nature of the function

- Sketch graph of a function

- Understand the ideas of double and triple integrals and their applications in finding the lengths,areas and volumes of irregular objects

- Solving and model applied problems

- Solve practical problems in physics using mathematics

MAT2C02 : MATHEMATICS

1. Course Outcomes
As a course in Mathematics, students be able to:

- Acquire knowledge of hyperbolic functions

- Understand application of integration in practical situations

- Learn improper integrals

- Know the concept sequence, series and their convergence

- Learn different coordinate systems

- Understand multi variable functions and their properties

2. Program Specific Outcomes

Upon completion of this course, students should be able to:

- Identify hyperbolic functions and solve problems related it
- Apply different coordinate systems in appropriate situations
- Use integration to find area and surface revolution of curves
- Solve improper integral problems
- Solve problems on multivariable functions

MAT3C03 : MATHEMATICS

1. Course Outcomes
As a course in Mathematics, students be able to:

- Study differential equations, especially first order differential equations and their solving methods
- Convert system of equations into matrix problem and solve it using matrix theory
- Study Vector Differential Calculus
- Understand of concept of double and triple integration

2. Program Specific Outcomes

Upon completion of this course, students should be able to:

- Solve first order differential equations using different methods
- Solve system of equations using matrix
- Apply the ideas in Vector Differential Calculus to solve practical problems in physics
- Convert problems into integration problems and find the values by using different theorems in double and triple integration

MAT4C04 : MATHEMATICS

1. Course Outcomes
As a course in Mathematics, students be able to:

- Acquire the knowledge of second order differential equations
- Solve Numerical Solutions of Ordinary Differential Equations
- Determine solutions of differential equations using Fourier series
- Determine solutions of differential equations using Laplace transformations
- Solve boundary value problems

2. Program Specific Outcomes

Upon completion of this course, students should be able to:

- Find solutions of second order differential equations
- Solve Numerical Solutions of Ordinary Differential Equations
- Determine solutions of differential equations using Fourier series
- Determine solutions of differential equations using Laplace transformations
- Solve boundary value problems

MSc MATHEMATICS

This course is designed to help students build the foundations for a successful career in mathematics research. It offers the freedom to choose from a variety of advanced lecture modules across pure and applied mathematics. Possible topics range from Algebra, Geometry, Analysis and Topology to many areas in the Applied Mathematics which actually enrich the studies and research in the former. With the help of Mathematical modelling one can work in interdisciplinary research areas to solve some real world problems.

MT1C01 Algebra- I

2. Course Outcomes

As a course in Mathematics, students should be able to:

- Acquire deep knowledge of finite groups and their representations
- Learn the concepts factor groups and different series of groups
- Get knowledge of group action and its applications
- Explain Sylow theory and isomorphism theorems
- Describe ring of polynomials and more about irreducible polynomials

3. Program Specific Outcomes

Upon completion of this course, students should be able to:

- Write finite groups as product of cyclic groups
- Solve problems in algebra using sylow theory
- Apply notion of group action of sets to solve practical problems
- Find irreducible polynomials using different tests

MT1C02 Linear Algebra

1. Course Outcomes

As a course in Mathematics, students should be able to:

- Acquire more knowledge about vector spaces and associated theorems
- Linear Algebra emphasizes the concept of vector spaces and linear transformations which are essential in simplifying various scientific problems.
- Explains the concepts of linear transformations and elementary canonical forms
- Understand the concept of inner product spaces

2. Program Specific Outcomes

Upon completion of this course, students should be able to:

- It aims at inculcating problem solving skills within students to enable them compute large linear systems.
- Solve problems in linear algebra using various theorems and results related to it
- Understand concepts of linear transformations and elementary canonical forms and apply them in practical situations
- Identify inner product spaces

MT1C03 Real Analysis-I

1. Course Outcomes

As a course in Mathematics, students should be able to:

- Understand the fundamental properties of real numbers
- Acquire the knowledge of continuity and differentiation
- Explain the Riemann stieltjes integration

- Explore the stone weirstrass theorem

2.Program Specific Outcomes

Upon completion of this course, students should be able to:

- Describe fundamental properties of the real numbers that lead to the formal development of real analysis.
- Construct rigorous mathematical proofs of basic results in real analysis.
- Appreciate how abstract ideas and regions methods in mathematical analysis can be applied to important practical problems.

MT1C04 Number Theory

1. Course Outcomes

As a course in Mathematics, students should be able to:

- Acquire the knowledge of divisors and theorems related to them
- Explore the use of Chinese reminder thorem
- Study more about prime numbers and theorems about prime numbers
- Study analytical approach to number theory problems
- Learn basics of cryptography and some methods in cryptography
-

2.Program Specific Outcomes

Upon completion of this course, students should be able to:

- Prove results involving divisibility and greatest common divisors
- Solve systems of linear congruences
- Find integral solutions to specified linear Diophantine Equations
- Apply Euler-Fermat's Theorem to prove relations involving prime numbers
- Good idea about prime numbers
- Understand and appreciate the use of number theory in cryptography

MT1C05 Discrete Mathematics

1. Course Outcomes

As a course in Mathematics, students should be able to:

- Study basics in Boolean algebra and related problems
- Learn basics in Graph theory and its applications
- Acquire the knowledge of automata and finite automata

2. Program Specific Outcomes

Upon completion of this course, students should be able to:

- Understand Boolean algebra and its applications
- Convert practical problems into graph theory problems and solve them
- Use automata effectively and motivated to learn other computer languages

MT2C07 Algebra- II

1. Course Outcomes

As a course in Mathematics, students should be able to:

- Study more about irreducible polynomials and its applications
- Study the extension fields and related thorems
- Acquire the knowledge of Field theory especially the automorphisms of fields
- Learn Galois theory

2. Program Specific Outcomes

Upon completion of this course, students should be able to

- Find irreducible polynomials over different fields and construct finite fields
- Appreciate and use the connection between normal groups and normal extensions
- Check solvability of the polynomials using Field theory

MT2C08 Real Analysis-II

1. Course Outcomes

As a course in Mathematics, students should be able to:

- Acquire the knowledge of measurable sets
- Learn more about integration
- Learn the concept of lebesgue integration
- Explains more about lebesgue integration and theorems related to it
- Study Lp spaces and its applications
- Understand different measures and its properties

2. Program Specific Outcomes

Upon completion of this course, students should be able to

- Use the knowledge of measurable sets and measurable functions
- Understand lebesgue integration and appreciate it
- Apply different theorems and propositions related to measure and integration to solve problems
- Apply Lp spaces and related theorems in practical problems

MT2C09 Topology

1. Course Outcomes

As a course in Mathematics, students should be able to:

- Study about shapes and theory related to it
- Learn basic concepts of topological spaces
- Extend continuous functions to topological spaces
- Learn the concepts of compactness and connectedness
- Study separable axioms and different theorems related to it

2. Program Specific Outcomes

Upon completion of this course, students should be able to

- Understand the concept of topological space
- Apply theorems related to topological spaces

- Identify compact and connected sets
- Understand separable axioms and spaces

MT2C10 ODE and Calculus of Variations

1. Course Outcomes

As a course in Mathematics, students should be able to:

- Acquire more knowledge about ordinary differential equations
- Study special functions and their applications
- Learn boundary value problems and calculus of variation

2. Program Specific Outcomes

Upon completion of this course, students should be able to:

- Solve ordinary differential equations using different methods
- Use special functions to solve differential problems
- Understand application of special functions in physics
- Solve boundary value problems

MT2C11 Operations Research

1. Course Outcomes

As a course in Mathematics, students be able to:

- Study convex sets and related theorems
- Defines a LPP in standard form and Canonical form
- Identifies a feasible solution, a basic feasible solution and an optimal solution using simplex method
- Understands duality theorems and dual simplex method
- Uses dual simplex method to find optimal solutions
- Explains the Transportation Problem and formulate it as an LPP and hence solve the problem
- Determine that an Assignment Problem is a special case of LPP and hence solve by Hungarian method Identifies
- Learn integer linear programming and sensitivity analysis

- Study flow ,network and theory of games

2. Program Specific Outcomes

Upon completion of this course, students should be able to:

- Place a Primal linear programming problem into standard form and use the Simplex Method to solve it
- Understands duality theorems and dual simplex method
- Explains the Transportation Problem and formulate it as an LPP and hence solve the problem
- Determine that an Assignment Problem is a special case of LPP and hence solve by Hungarian method
- Solve integer linear programming problems
- Understand flow ,network and game theory and its applications

MT3C12 Multivariable Calculus and Geometry

1. Course Outcomes

As a course in Mathematics, students should be able to:

- Acquire deep knowledge of multi variable functions
- Understand differentiation of multivariable functions and theorems related to it
- Study basics of differential geometry
- Learn different concepts in differential geometry

2. Program Specific Outcomes

Upon completion of this course, students should be able to:

- Understand multi variable functions and apply them on appropriate situations
- Understand different notions in differential geometry and understand its applications

MT3C13 Complex Analysis

1. Course Outcomes

As a course in Mathematics, students should be able to:

- Acquire the knowledge of fundamental concepts of complex analysis
- Learn complex analysis techniques
- Learn the concepts conformality, calculus of residues ,power series expansion, periodic functions,harmonic functions

2. Program Specific Outcomes

Upon completion of this course, students should be able to:

- Explain the fundamental concepts of complex analysis and their role in modern mathematics and applied contexts
- Demonstrate accurate and efficient use of complex analysis techniques
- Demonstrate capacity for mathematical reasoning through analyzing, proving and explaining concepts from complex analysis
- Apply problem –solving using complex analysis techniques applied to diverse situations in physics, engineering and other mathematical contexts

MT3C14 Functional Analysis

1. Course Outcomes

As a course in Mathematics, students should be able to:

- This area combines ideas from linear algebra and analysis in order to handle infinite-dimensional vector spaces and linear mappings thereof
- The Functional Analysis is related to problems arising in Partial Differential Equations, Measure Theory and other branches of Mathematics
- Know and clearly understand the classic theorems of Functional Analysis.
- To understand the concepts of Banach and Hilbert spaces and to learn to classify the standard examples. In particular, spaces of sequences and functions
- To learn to use properly the specific techniques for bounded operators over normed and Hilbert spaces

2. Program Specific Outcomes

Upon completion of this course, students should be able to:

- To learn to recognize the fundamental properties of normed spaces and of the transformations between them
- To be acquainted with the statement of the Hahn-Banach theorem and its corollaries.
- Understand main properties of bounded operators and get an idea to deal with infinite dimensional vector spaces

MT3C15 PDE and Integral Equations

1. Course Outcomes

As a course in Mathematics, students should be able to:

- Acquire knowledge of partial differential equations
- Learn to solve linear Partial Differential with different methods
- Solve some physical problems in Engineering and Biological models that results in partial differential equations
- Study Integral Equations and to know that what is the relationship between the integral equations and ordinary differential equations

2. Program Specific Outcomes

Upon completion of this course, students should be able to:

- Classify partial differential equations and transform into canonical form
- Solve linear partial differential equations of both first and second order
- Apply partial differential equations to solve practical problems
- Solve problems in integral equations using different methods

MT4E01 COMMUTATIVE ALGEBRA

1. Course Outcomes

As a course in Mathematics, students should be able to:

- Acquire knowledge of basic concepts and constructions in commutative algebra
- Study more about rings and modules
- Learn the concept of localization of rings and its applications
- Understand decomposition of ideals
- Learn Artinian and Noetherian rings and modules and related theorems

2. Program Specific Outcomes

Upon completion of this course, students should be able to:

- Define basic concepts and constructions in commutative algebra
- Perform simple specific calculations in number rings ,polynomial rings and locations of polynomial rings
- Use the results in commutative algebra to perform simple reasoning to show the properties of rings and modules
- Conduct researches in commutative algebra and its applications

MT4E11 ADVANCED FUNCTIONAL ANALYSIS

1. Course Outcomes

As a course in Mathematics, students should be able to:

- Acquire more knowledge about bounded operators
- Learn the concepts of spectrum of operators and related theorems
- Explains the spectral theory of operators in Hilbert spaces
- Learn dual spaces and its applications

2. Program Specific Outcomes

Upon completion of this course, students should be able to

- Understand and find the spectrum of different operators
- Apply spectral theory to sole practical problems
- Identify dual spaces of different spaces

MT4E12 DIFFERENTIAL GEOMETRY

1. Course Outcomes

As a course in Mathematics, students should be able to:

- Acquire knowledge of key concepts and techniques in Differential geometry
- Learn more about intrinsic geometry of curves and surfaces and its applications

2. Program Specific Outcomes

Upon completion of this course, students should be able to

- Acquaint students with basic ideas and techniques of Differential geometry
- Get complete view of calculus ,partial differential equations by studying about surface and curves

MT4E10 ADVANCED OPERATIONS RESEARCH

1. Course Outcomes

As a course in Mathematics, students should be able to:

- Understand and apply fundamental concepts Non Linear Programming
- Understand applications of Kuhn-Tucker Theory

- Learn the concepts of Quadratic Programming and Geometric Programming
- Get an idea about step by step approach to solve a large problem by Dynamic Programming.

2. Program Specific Outcomes

Upon completion of this course, students should be able to

- Develop good insight about the techniques of Nonlinear Programming as most of the problems which nature pauses are nonlinear in nature.
- Decompose a large problem to multistage problem through Dynamic Programming.