GOVT POST GRADUATE COLLEGE NALAGARH, SOLAN

DEPARTMENT OF BOTANY
B.Sc. Botany

PROGRAMME OUTCOMES

After completion of the BSc Botany, the student will be able to

Knowledge and understanding of: 1.The range of plant diversity in terms of structure, function and environmental relationships. 2. The evaluation of plant diversity. 3. Plant classification and the flora of North India especially Himachal. 4. The role of plants in the functioning of the global ecosystem. 5. A selection of more specialized, optional topics.

Intellectual skills will make students' to: 1. Think logically and organize tasks into a structured form.2. Assimilate knowledge and ideas based on wide reading and through the internet. 3. Transfer of appropriate knowledge and methods from one topic to another within the subject. 4. Understand the evolving state of knowledge in a rapidly developing field. 5. Construct and test hypothesis. 6. Plan, conduct and write a report on an independent term project.

Practical skills: Students learn to carry out practical work, in the field and in the laboratory, with minimal risk. They gain introductory experience in applying each of the following skills and gain greater proficiency in a selection of them depending on their choice of optional modules. 1. Interpreting plant morphology and anatomy. 2. Plant identification. 3. Vegetation analysis techniques. 4. A range of physiochemical analyses of plant materials in the context of plant physiology and biochemistry.

Scientific Knowledge: Apply the knowledge of basic science, life sciences and fundamental process of plants to study and analyze any plant form.

Problem analysis: Identify the taxonomic position of plants, formulate the research literature, and analyze non reported plants with substantiated conclusions using first principles and methods of nomenclature and classification in Botany.

Design/development of solutions: Design solutions from medicinal plants for health problems,

disorders and disease of human beings and estimate the phytochemical content of plants which meet the specified needs to appropriate consideration for the public health

Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern instruments and equipments for Biochemical estimation, Molecular Biology, Biotechnology, Plant Tissue culture experiments, cellular and physiological activities of plants with an understanding of the application and limitations.

The Botanist and society: Apply reasoning informed by the contextual knowledge to assess plant diversity, its importance for society, health, safety, legaland environmental issues and the consequent responsibilities relevant to the biodiversity conservation practice.

Environment and sustainability: Understand the impact of the plant diversity in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

Ethics: Apply ethical principles and commit to environmental ethics and responsibilities and norms of the biodiversity conservation.

Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work,as a member and leader in a team, to manage projects and in multidisciplinary environments.

Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Course Outcomes of B.Sc. Botany

1. Critically evaluation of ideas and arguments by collection relevant information about the plants, so as recognize the position of plant in the broad classification and phylogenetic level.

2. Identify problems and independently propose solutions using creative approaches, acquired through interdisciplinary experiences, and a depth and breadth of knowledge/expertise in the field of Plant Identification.

3. Accurately interpretation of collected information and use taxonomical information to evaluate and formulate a position of plant in taxonomy.

4. Students will be able to apply the scientific method to questions in botany by formulating testable hypotheses, collecting data that address these hypotheses, and analyzing those data to assess the degree to which their scientific work supports their hypotheses.

5. Students will be able to present scientific hypotheses and data both orally and in writing in the formats that are used by practicing scientists.

6. Students will be able to access the primary literature, identify relevant works for a particular topic, and evaluate the scientific content of these works.

7. Students will be able to apply fundamental Physical, Chemical, and mathematical tools to the analysis of relevant biological situations.

8. Students will be able to identify the major groups of organisms with an emphasis on plants and be able to classify them within a phylogenetic framework. Students will be able to compare and contrast the characteristics of plants, algae, and fungi that differentiate them from each other and from other forms of life.

9. Students will be able to use the evidence of comparative biology to explain how the theory ofevolution offers the only scientific explanation for the unity and diversity of life on earth. They will be able to use specific examples to explicate how descent with modification has shaped plant morphology, physiology, and life history.

10. Students will be able to explain how Plants function at the level of the gene, genome, cell, tissue, Flower development. Drawing upon this knowledge, they will be able to givespecific examples of the physiological adaptations, development, reproduction and mode oflife cycle followed by different forms of plants.

11. Students will be able to explain the ecological interconnectedness of life on earth by tracingenergy and nutrient flow through the environment. They will be able to relate the

physical features of the environment to the structure of populations, communities, and ecosystems.

12. Students will be able to demonstrate proficiency in the experimental techniques and methods of analysis appropriate for their area of specialization within biology.

Programme Specific Outcomes: B.Sc.

Botany

First Year

Paper-I: Course: Biodiversity (Microbes, Algae, Fungi and Archegoniate) BOTA 101

On completion of the course, students are able to:

1. Understand the diversity among Algae.

2. Know the systematic, morphology and structure, of Algae. Understand the life cycle pattern of Algae.

3. Understand the useful and harmful activities of Algae.

4. Understand the Biodiversity of Fungi

5. Know the Economic Importance of Fungi

6. Understand the morphological diversity of Bryophytes.

7. Understand the economic importance of the Bryophytes.

8. Understand the morphological diversity of Bryophytes and Pteridophytes and Gymnosperms.

9. Understand the economic importance of the Bryophytes and Pteridophytes and Gymnosperms.

10. Know the evolution of Bryophytes and Pteridophytes and Gymnosperms.

Paper-II: Plant Ecology and Taxonomy BOTA 102

1. Understand the habit of the angiosperm plant body.

2. Know the vegetative characteristics of the plant.

3. Learn about the reproductive characteristics of the plant.

4. Understand the plant morphology and basic taxonomy.

5. Taxonomic Mastery: Graduates will demonstrate a comprehensive understanding of plant taxonomy, including the principles of classification, nomenclature, and identification of major plant groups.

6. Ecological Understanding: Students will be able to analyze and interpret plant community structures, dynamics, and interactions within various ecosystems, demonstrating a deep understanding of ecological principles and processes.

7. Field Skills: Graduates will possess proficient field skills in plant identification, habitat assessment, and ecological sampling techniques necessary for conducting plant ecological research or fieldwork.

8. Data Analysis and Interpretation: Students will be capable of collecting, analyzing, and interpreting ecological data related to plant communities and populations, employing appropriate statistical and computational methods.

9. Conservation Awareness: Graduates will demonstrate an awareness of the importance of plant conservation, understanding the threats to plant biodiversity and the principles and methods of conservation biology and management.

Second Year

Paper-III: Plant Anatomy and Embryology BOTA 201
On completion of the course, students are able to:

1. Anatomical Proficiency: Graduates will demonstrate a thorough understanding of plant anatomy, including the structure and function of cells, tissues, and organs in various plant organs (roots, stems, leaves, flowers).

2. Embryological Knowledge: Students will be able to describe the developmental processes involved in plant embryogenesis, including fertilization, embryonic cell division, tissue differentiation, and embryo maturation.

3. Microscopic Techniques: Graduates will possess proficiency in using light microscopy, electron microscopy, and other advanced imaging techniques to study plant anatomy and embryology at the cellular and subcellular levels.

4. Morphological Variation: Students will recognize and interpret morphological variations in plant structures across different taxa, understanding the evolutionary significance and ecological adaptations associated with these variations.

5. Reproductive Biology: Graduates will have a comprehensive understanding of plant reproductive biology, including the mechanisms of pollination, fertilization, seed development, and fruit formation in flowering plants.

6. Comparative Anatomy: Students will be able to compare and contrast the anatomical features of different plant species, recognizing evolutionary patterns and relationships based on structural similarities and differences.

7. Functional Adaptations: Graduates will understand how anatomical and embryological features contribute to the physiological functions and ecological adaptations of plants in various environments.

Paper-IV: Plant Physiology and metabolism BOTA 202
On completion of the course, students are able to:

1. Metabolic Pathways: Graduates will demonstrate a comprehensive understanding of the major metabolic pathways in plants, including photosynthesis, respiration, nitrogen metabolism, and secondary metabolite biosynthesis.

2. Physiological Processes: Students will be able to explain the physiological processes underlying plant growth, development, and responses to environmental stimuli, such as water and nutrient uptake, transpiration, stomatal regulation, and hormone signaling.

3. Photosynthetic Efficiency: Graduates will understand the mechanisms of photosynthesis, including light harvesting, carbon fixation, and photorespiration, and be able to evaluate factors affecting photosynthetic efficiency in different plant species and environmental

conditions.

4. Respiratory Metabolism: Students will comprehend the pathways and regulation of aerobic and anaerobic respiration in plants, including the production of ATP, carbon dioxide release, and the role of mitochondria in energy metabolism.

5. Nutrient Uptake and Assimilation: Graduates will possess knowledge of nutrient uptake mechanisms, mineral nutrition, and the assimilation of essential elements into organic compounds, understanding their roles in plant growth, development, and stress responses.

6. Water Relations: Students will be familiar with the mechanisms of water transport in plants, including transpiration, water potential, osmotic regulation, and the role of aquaporins, and be able to analyze plant-water relations in different environmental contexts.

7. Hormonal Regulation: Graduates will understand the roles of plant hormones in regulating growth, development, and responses to biotic and abiotic stresses, including auxins, cytokinins, gibberellins, abscisic acid, ethylene, and jasmonates.

8. Environmental Adaptations: Students will recognize how plants adapt physiologically and metabolically to environmental factors such as light intensity, temperature, drought, salinity, and nutrient availability, and evaluate strategies for enhancing plant stress tolerance.

9. Experimental Techniques: Graduates will possess practical skills in conducting physiological experiments, including measurements of gas exchange, chlorophyll fluorescence, enzyme activities, and metabolite profiling, and interpreting experimental results.

Third Year

Paper-V: Economic Botany and Biotechnology BOTA 301
On completion of the course, students are able to:

1. Plant Diversity and Utilization: Graduates will demonstrate an understanding of the diversity of plant species and their economic importance, including food crops, medicinal plants, ornamentals, fiber crops, timber species, and industrial crops.

2. Botanical Knowledge: Students will be able to identify and classify economically important plant species, understand their botanical characteristics, distribution, cultivation

requirements, and utilization potentials.

3. Biotechnological Techniques: Graduates will possess practical skills in biotechnological techniques used in plant improvement, such as tissue culture, genetic transformation, molecular markers, genomics, and gene editing (e.g., CRISPR-Cas9).

4. Crop Improvement: Students will understand the principles and methods of crop improvement, including breeding strategies, hybridization techniques, selection criteria, and the development of improved varieties with desirable traits.

5. Medicinal Plant Biotechnology: Graduates will be familiar with biotechnological approaches for the cultivation, propagation, conservation, and enhancement of medicinal plants, as well as the production of bioactive compounds and herbal medicines.

6. Genetic Resources Conservation: Students will recognize the importance of conserving plant genetic resources for future generations, understanding the principles and methods of germplasm conservation, seed banking, and ex situ preservation.

7. Industrial Applications: Students will learn about the industrial applications of plant-derived products, such as biofuels, biopolymers, phytochemicals, flavors, fragrances, cosmetics, and pharmaceuticals, and the biotechnological processes involved in their production.

8. Sustainable Agriculture: Graduates will appreciate the role of economic botany and biotechnology in promoting sustainable agriculture practices, conservation of biodiversity, and the mitigation of environmental impacts associated with agricultural production.
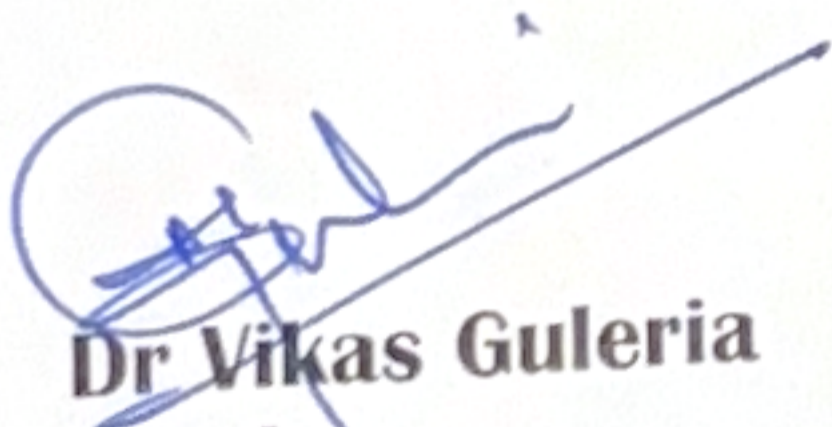
Paper-VI: Cell and Molecular Biology BOTA 303
On completion of the course, students are able to:

1. Cellular Structure and Function: Graduates will demonstrate a comprehensive understanding of cellular structures, organelles, and their functions, including the plasma membrane, nucleus, endoplasmic reticulum, Golgi apparatus, mitochondria, and chloroplasts.

2. Cellular Processes: Students will be able to explain key cellular processes such as cell signaling, cell cycle regulation, cell division, apoptosis, cellular transport mechanisms, and intracellular trafficking.

3. Molecular Genetics: Graduates will possess a strong foundation in molecular genetics,

including DNA replication, transcription, RNA processing, translation, gene regulation, and the mechanisms of genetic inheritance.

4. Genome Organization and Maintenance: Students will understand the organization and maintenance of the genome, including chromatin structure, DNA packaging, DNA repair mechanisms, and the regulation of gene expression at the epigenetic level.

5. Protein Structure and Function: Graduates will comprehend the structure and function of proteins, including protein folding, post-translational modifications, enzyme kinetics, protein-protein interactions, and the role of proteins in cellular processes.

6. Techniques in Cell and Molecular Biology: Students will be proficient in using laboratory techniques commonly employed in cell and molecular biology research, including DNA isolation, PCR, gel electrophoresis, blotting techniques, ELISA, Sequencing methods, immunofluorescence, and microscopy.

7. Cell Culture and Tissue Engineering: Graduates will have practical experience in cell culture techniques, including cell line maintenance, primary cell isolation, differentiation protocols, and applications in tissue engineering and regenerative medicine.

8. Applications in Biotechnology: Students will appreciate the applications of cell and molecular biology in biotechnology, medicine, pharmaceuticals, and biomedicine, including drug discovery, gene therapy, molecular diagnostics, and personalized medicine.

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Programme outcomes for Chemistry
BSC (UG chemistry)
Session: 2023-2024

Programme	Programme Outcomes	Programme Specific Outcomes
Chemistry	• Study of various concepts of Chemistry through theory and Practical. •Students will be able to solve problems and apply appropriate techniques to achieve a solution, correctness and interpretation of calculated results. • Students will be able to use standard laboratory equipment, modern instrumentation, and classical techniques to carry out experiments, as well as interpretation of data generated in instrumental chemical analyses upon completion of a B. Sc degree in Chemistry. • To Equip the students with the skill to analyze and solve the problems.	Students will know proper regulations and procedures for safe handling, storage and use of chemicals. Hence will become eco-friendly and eco-protective, an ability to determine hazards associated with carrying out chemical experiments in terms of chemical toxicity, chemical stability and chemical reactivity and be able to find information to enable effective risk assessments to be carried out. • Students will have strong foundations in basic principles and theories of the main areas of organic, inorganic, analytical, physical and biological chemistry and will be able to apply chemical knowledge in many applications. Students will understand the ethical, historic, philosophical, and environmental dimensions of problem

COURSE OUT-COMES.

Paper Code	Paper Title	Course outcome
CHEM 101TH	Atomic Structure, Bonding, General Organic Chemistry and Hydrocarbons	• Knows about Atomic structure quantum model. Bohr's Theory and its limitations, Schrodinger Wave Equation and its function, quantum numbers. Slater rules and its applications and limitations. • Explains ionic and covalent bonding with VBT and VESPER and MOT . • Physical effects and electronic displacement in organic molecules. • Reactive intermediates. • Conformational, optical and geometrical type of stereoisomerism and assignment of configuration • Preparation reaction and structure of alkenes, alkenes and alkynes.

CHEM 101PR	Atomic Structure, Bonding, General Organic Chemistry and Hydrocarbons Lab	• Experimentally performs volumetric determination by neutralization and redox titrations thatpr ovokes analytical skills in students. • In organic qualitative analysis to detect the extra element nitrogen, sulphur and halogens present in the organic compound • To separate the mixture by chromatography prepares students to learn separations using this technique in industrial as well as medical areas.
CHEM 102 TH	States of Matter, Chemical Kinetics, & Functional Group Organic Chemistry	• detailed study of states of matter. • Detailed description of chemical Kinetics. • Preparation and chemical reaction of Alkyl halide, alcohol and phenol, aldehydes and ketones root into the understanding of their physical and chemical properties.
CHEM 102P R	States of Matter, Chemical Kinetics, & Functional Group Organic Chemistry Lab	•determination of surface tension and viscosity of given liquids by using stalagmometer ad viscometer respectively • study of rate of reaction •analysis of different oganic compounds

CHEM 201 TH	Solutions, Phase Equilibria, Conductance, Electrochemistry & Organic Chemistry	• Using concepts of distribution law & phase equilibrium able to describe one or multi component system, salt hydrolysis, distribution indicator and also extraction of metal from its ores. • Study Basic concepts and applications of electrochemistry. • Study preparations, physical and chemical properties of carboxylic acids, their derivatives, amines and diazonium salt. • Understand ideal and non ideal solutions as well as the basic concept in phase equilibrium. • Know about different types of conductometric and potentiometric titration.
CHEM201 PR	Solutions, Phase Equilibria, Conductance, Electrochemistry & Organic Chemistry Lab.	• Study of distribution law and its applications. • To determine cell constant and equivalent conductance of weak acids • preparation of various organic compounds • With the help of these experiments students come to know about the advantage of conductometric titrations and chromatographic technique

CHEM 202TH	Chemistry of Main group elements, Chemical energetic and equilibria	• General Trends and characteristics of s and p block elements including detailed description of various properties. • Students will learn about basics of thermodynamics • detailed study of various types of equilibria
CHEM 202 PR	Chemistry of Main group elements, Chemical energetic and equilibria Lab	• Analysis of Inorganic compounds • determination of various thermodynamic properties such as heat of solution, heat of capacity, heat of hydration etc • determination of pH and buffer solution preparation.

CHEM203TH	Basic Analytical Chemistry	Skill enhancement courses are designed to increase the mental and experimental skills of students in chemistry. • Students know the analysis methods and analytical principles. • This course develops analytical thinking and awareness, includes basic analytical terms and its applications to soil, food and environment. A part of this course develops industrial skills and awareness regarding adulterations, contaminants and
CHEM 204	Fuel Chemistry & Chemistry of Cosmetics and Perfumes	The course includes the chemistry of fuel, cosmetics and perfumes. Students will come to know the different chemical aspects of these commercial products. • Study about synthesis and refining of petrochemical fuel and lubricants. • Graduates will create knowledge of cosmetics and perfume synthesis and their uses.

CHEM 301TH	Polynuclear Hydrocarbons, Dyes, Heterocyclic compounds and spectroscopy (IR, UV, NMR)	• Preparation, detailed study of Polynuclear Hydrocarbons. • Introduction to synthetic dyes • Understanding heteronuclear chemistry involving aromatic compound, their properties • Application of UV, IR , NMR spectroscopy in organic molecules to characterize organic molecule
CHEM 301PR	Polynuclear Hydrocarbons, Dyes, Heterocyclic compounds and spectroscopy (IR, UV, NMR) LAB	• Become able to separate the given mixture by paper chromatography. • Able to separate ions and mixture by the use of chromatographic technique also colorimetry. • Able to prepare complexes and measure their conductivity.
CHEM 305TH	Polymer Chemistry	.• Detailed study of various types of polymers • Mechanism of polymerization and various theories. • Applications of various polymers

CHEM307	Chemical Tech. & Society and Business Skills for Chemistry	Chemical Technology and Society and Business skill for Chemists.
		• Introduction to clean technology and scope of different types of equipment needed in chemical industries.
		• Exploration of societal, technological issues, chemical and scientific literacy.
		• Basics of business like business plans, market need and project management.
		• Role of chemistry in India and Global economies
		• Current challenges and opportunities for chemistry
		• Financial aspects of business with case studies
		• Concept of intellectual property and patents
		• Apply the knowledge in current challenges and opportunities for chemistry

CHEM 305PR	Polymer chemistry LAB	• Polymer Synthesis & Characterization.
		• Determination of molecular weight by different methods.
		• Polymer synthesis provides a root to the formation of plastics, biosynthesis of proteins and highly polymeric carbohydrates.
		• Polymer Characterization is important for the synthesis of new materials, their evaluation and improvement in performance

CHEM308	Pesticide Chemistry & Pharmaceutical Chemistry	• Introduction to pesticides, benefits and adverse effects of pesticides, structure activity relationship in pesticides; can easily be recognized by knowing about them. • Synthesis uses of pesticides in organochlorines, organophosphates, carbamates, anillides and quinones. • Synthesis of various classes of drugs, design and development.. • They come to know about synthesis of some vitamins.

1. Dr. Kumari Bandna
2. Prof. Pooja
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GOVT COLLEGE NALAGARH, SOLAN

DEPARTMENT OF COMPUTER SCIENCE

B.Sc. Physical Science with Physics, Computer Science & Mathematics

Programme Specific Outcomes:

The Program Specific Outcomes (PSOs) for the B.Sc. Physical Science with Physics, Computer Science, and Mathematics are designed to equip students with skills and knowledge that allow them to:

1. Apply Core Knowledge: Utilize fundamental concepts and methodologies in physics, computer science, and mathematics to solve complex problems. This includes applying theories in mechanics, electromagnetism, calculus, programming, and data structures to practical scenarios.

2. Develop Computational Solutions: Design and implement efficient algorithms and computer programs, use database systems, and work with data structures to address a wide range of computational problems. This outcome emphasizes the ability to create and manage software applications, understand operating systems, and work with various programming environments.

3. Analyze and Model Physical Phenomena: Use experimental and theoretical physics knowledge to understand and model physical systems. This includes data collection, statistical analysis, and interpretation of results, enabling students to make informed predictions and conclusions based on scientific reasoning.

4. Employ Mathematical Reasoning: Formulate and solve mathematical models for real-world problems using calculus, linear algebra, numerical methods, and other mathematical techniques. This outcome prepares students for analytical roles that require precise quantitative and logical reasoning.

5. Conduct Research and Projects: Engage in independent research projects and practical assignments in their areas of study. Students will be able to design experiments, conduct scientific inquiries, and use computer tools to analyze data, developing skills in project management, critical thinking, and technical writing.

6. Adapt to Interdisciplinary Roles: Leverage the interdisciplinary foundation provided by the program to apply scientific, mathematical, and computational skills in various fields, including finance, engineering, data science, and technology sectors.

7. Pursue Advanced Studies and Careers: With a strong foundation in three critical disciplines, graduates will be well-prepared to pursue higher education and research in physics, computer science, mathematics, or interdisciplinary studies, as well as technical and analytical roles in industries such as IT, engineering, data analysis, and education.

8. Ethical and Environmental Responsibility: Understand the impact of scientific and technological advancements on the environment and society, adhering to ethical standards and sustainable practices in professional settings.

These program-specific outcomes aim to foster well-rounded graduates who can adapt to diverse roles, contribute to scientific and technological progress, and pursue lifelong learning.

Course Outcomes of B.Sc. Physical Science with Physics, Computer Science & Mathematics

The course outcomes for the B.Sc. Physical Science with Physics, Computer Science, and Mathematics program cover a broad range of foundational skills and subject-specific knowledge in each of the three disciplines. Here are the expected learning outcomes across these fields:

1. Physics: Students will gain a solid grounding in mechanics, electricity, magnetism, thermodynamics, optics, and modern physics. They will develop practical skills through laboratory experiments, enhancing their ability to apply theoretical knowledge to real-world scenarios, analyze physical phenomena, and interpret scientific data.

2. Computer Science: The curriculum includes fundamental and advanced topics such as programming, computer architecture, database management, operating systems, data structures, and software engineering. Students will acquire problem-solving skills, proficiency in programming languages like Python and PHP, and practical skills in developing software applications and managing databases.

3. Mathematics: The mathematical component builds strong analytical and problem-solving skills, covering calculus, algebra, real analysis, linear algebra, and numerical methods. These skills will enable students to engage in quantitative analysis, formulate mathematical models, and tackle complex problems.

4. Interdisciplinary Skills: The program also integrates interdisciplinary and skill-enhancement courses, including environmental science and elective courses across the three disciplines. This approach aims to foster a well-rounded education, critical thinking, and adaptability in diverse professional and research environments.

5. Project and Research Skills: Through projects and electives, students will learn to conduct independent research, improve technical writing, and enhance presentation skills, which are essential for careers in academia, industry, and further studies.

These outcomes prepare graduates for various career paths, including research, teaching, software development, data analysis, and technical roles in physics, computer science, and related fields.

Programme Specific Outcomes of B.Sc. Physical Science with Physics, Computer Science & Mathematics :

COMP101TH: Problem Solving using Computer

The Program Specific Outcomes (PSOs) for the unit on Computer Fundamentals and Python Programming include the following objectives:

1. Understanding Computer Fundamentals: Students will understand the essential characteristics, uses, types, and generations of computers, as well as basic computer organization. This includes comprehending the structure of a computer's CPU, ALU, memory hierarchy, registers, and I/O devices, which serves as the groundwork for future studies in computer science.

2. Problem-Solving and Program Design: Gain foundational skills in planning and structuring computer programs. Students will learn to define problems, design programs, and understand various types of programming errors and debugging methods. Techniques such as flowcharting, decision tables, algorithms, and structured programming methodologies (top-down and bottom-up) will be used to develop systematic problem-solving skills.

3. Python Programming Proficiency: Develop a strong foundation in Python programming. Students will learn the structure of Python programs, basic syntax, and use of Python as a calculator. They will become proficient in writing code with control statements, loops, operators, and managing program flow, including break, continue, and pass statements.

4. Data Structures in Python: Understand and implement fundamental data structures in Python such as numbers, strings, lists, tuples, and dictionaries. This knowledge is crucial for efficient data manipulation and organization in computer programs.

5. Advanced Python Concepts: Introduction to advanced topics in Python, such as object-oriented programming (OOP) with classes, inheritance, regular expressions, event-driven programming, and GUI programming. This prepares students for more complex programming tasks and problem-solving.

6. Application Development Using Python: Through hands-on labs, students will develop practical Python programming skills. They will write programs to perform tasks like converting temperature scales, calculating grades, finding areas of geometric shapes, generating Fibonacci sequences, computing factorials, and performing matrix operations.

7. Data Visualization and Mathematical Modeling: Use Python to create visual representations of mathematical objects, display histograms, plot functions like sine, cosine, polynomial, and exponential curves, and develop models for real-world phenomena (e.g., bacterial growth, chemical reactions). These skills are essential for data analysis, scientific computing, and simulations.

8. Research and Technical Proficiency: The laboratory component (software lab) enhances students' ability to independently design, implement, and test Python programs. They will gain experience in data visualization and working with libraries and modules in Python, which are essential for data science, engineering, and scientific research.

These outcomes enable students to build a strong foundation in computer fundamentals and Python programming, equipping them with critical skills for advanced courses, research, and professional work in computer science and data analysis.

COMP102TH: Office Automation Tools

The Program Specific Outcomes (PSOs) for COMP102TH: Office Automation Tools aim to equip students with essential documentation, accounting, and presentation skills using office productivity software. Upon completion of this course, students will be able to:

1. Master Documentation Techniques: Understand and apply word processing skills using MS Office, Libre Office, or Open Office. This includes creating, formatting, and organizing documents with advanced tools such as tables, lists, headers, footers, and templates to meet professional standards.

2. Perform Spreadsheet-Based Calculations and Analysis: Gain proficiency in spreadsheet applications to perform data entry, formatting, calculations, and complex data analysis. Students will be able to use formulas, functions, create charts and graphs, work with pivot tables, and automate tasks with macros for efficient data handling and reporting.

3. Develop and Enhance Presentation Skills: Use presentation software to design and deliver engaging presentations. This involves creating visually appealing slides, formatting text and images, using transitions and animations, and adding multimedia elements to convey information effectively in academic and professional settings.

4. Handle Office Productivity Software: Acquire a working knowledge of popular office productivity software tools and apply them for various tasks, whether for documentation, data analysis, or presentations. This foundational skill is highly transferable across administrative, technical, and business roles.

5. Create and Format Complex Documents in Labs: In practical lab sessions, students will apply their learning by creating documents like grocery lists, directories, timetables, and newsletters. They will implement formatting skills, use different fonts, styles, and layouts, and handle document settings like page numbers and footers for structured and professional-looking outputs.

6. Conduct Financial Calculations and Salary Computations Using Spreadsheets: Use spreadsheets for financial tasks, such as calculating grades, commissions, and salaries with allowances and deductions. Students will be able to design spreadsheets to compute net salaries by applying conditional formatting, advanced formulas, and logic-based functions.

7. Craft Visual and Interactive Presentations: Learn practical presentation skills, including designing slides with themes, aligning text and images, adding effects, and customizing layouts. These skills will help students effectively communicate information and ideas visually in various professional settings.

8. Integrate Graphics and Data Visualizations: Develop the ability to include and manipulate graphic objects such as charts, graphs, and other visuals in documents and presentations, enhancing the clarity and impact of data presentation and storytelling.

These outcomes prepare students to confidently use office tools for professional documentation, data management, and presentation, making them valuable in any administrative, analytical, or technical role.

COMP201TH: Computer System Architecture

The Program Specific Outcomes (PSOs) for COMP201TH: Computer System Architecture aim to provide students with foundational knowledge of computer hardware and system architecture. By the end of this course, students will be able to:

1. Understand the Fundamentals of Computer Architecture: Gain a solid understanding of basic computer architecture concepts, including logic gates, Boolean algebra, combinational and sequential circuits, and how they form the foundation of computer systems.

2. Master Data Representation and Arithmetic Operations: Comprehend number systems, complements, and fixed and floating-point representations. Students will learn basic arithmetic operations (addition, subtraction, magnitude comparison) and character representation methods, crucial for data manipulation in computing systems.

3. Analyze Basic Computer Organization and Design: Understand the structural organization of computer registers, bus systems, instruction sets, timing, and control. This knowledge equips students to grasp the organization of the CPU and its operations, including memory reference and input-output functions.

4. Understand Central Processing Unit (CPU) Structure and Operations: Gain insight into the register organization, arithmetic and logical micro-operations, and stack organization within the CPU. This unit helps students comprehend the microprogrammed control of CPU processes and operations, critical for effective resource management within a computer.

5. Programming the Basic Computer: Acquire practical skills in programming the basic computer, including instruction formats, addressing modes, and instruction codes. Students will learn the basics of machine and assembly language, essential for low-level programming and understanding how software interacts with hardware.

6. Explore Input-Output Organization: Understand the structure and functioning of input-output (I/O) organization, including peripheral devices, I/O interfaces, data transfer modes, and direct memory access

(DMA). This knowledge prepares students to manage data flow and communication between internal and external devices.

7. Apply Circuit Design Principles: Use knowledge of combinational and sequential circuits, decoders, multiplexers, and flip-flops to design efficient circuit structures for computer systems. This skill is essential for understanding how complex operations are broken down into manageable digital components.

8. Understand Memory Organization and Storage: Develop an understanding of how memory units work within computer systems, including types of memory, memory hierarchy, and organization. This prepares students to design and optimize memory usage in computer systems.

These outcomes enable students to understand and work with the internal architecture of computers, preparing them for further study in computer engineering, systems design, and hardware-related roles in the technology sector.

COMP202TH: Database Management System

The Program Specific Outcomes (PSOs) for COMP202TH: Database Management System aim to build students' understanding and practical skills in database design and management. By the end of this course, students will be able to:

1. Understand Database Management System Fundamentals: Gain a comprehensive understanding of the fundamental elements of DBMS, including data models, architecture, and the concept of data independence. This foundation is crucial for managing and organizing data efficiently in various applications.

2. Develop Entity-Relationship (ER) Models: Design and interpret ER and Enhanced ER (EER) models for representing simple database application scenarios. This outcome equips students with skills in data modeling and helps them visualize the structure of databases before implementation.

3. Apply SQL for Database Manipulation: Use Structured Query Language (SQL) to create, query, update, and manage databases. Students will learn to execute DDL (Data Definition Language) and DML (Data Manipulation Language) commands, enabling them to handle real-world data management tasks effectively.

4. Implement Relational Database Concepts: Understand and apply the principles of relational databases, including relational constraints and relational algebra. This outcome helps students manage data integrity, perform relational operations, and optimize data retrieval in relational databases.

5. Normalize Databases for Optimization: Improve database design through normalization techniques, focusing on functional dependencies and achieving normal forms up to the third normal form. This skill is essential for reducing redundancy and enhancing database efficiency and consistency.

6. Translate ER Models to Relational Schemas: Convert ER and EER models into relational schemas, preparing students to implement theoretical designs into practical, functioning databases. This skill is fundamental for developing robust database structures that meet business and application requirements.

7. Perform Advanced SQL Operations: Master advanced SQL operations, including complex queries with multiple tables, nested selects, and set operations such as union, intersect, and minus. Students will also learn to organize and categorize data using `GROUP BY` and `ORDER BY`, along with aggregate functions.

8. Use Database Management Tools: Gain hands-on experience with database management systems like MySQL or Access in lab sessions. Students will implement various SQL commands, manage database schema, and perform data manipulation to reinforce theoretical knowledge with practical application.

These outcomes prepare students to work confidently with relational databases, making them valuable for roles in data management, software development, and systems analysis. The skills acquired in this course are also foundational for more advanced studies in data science, analytics, and database administration.

COMP301TH: Operating System

The Program Specific Outcomes (PSOs) for COMP301TH: Operating System provide students with a deep understanding of operating system concepts, enabling them to manage system resources effectively. Upon completing this course, students will be able to:

1. Comprehend Operating System Services: Understand the various services provided by operating systems across different levels, from process and memory management to file and device management. Students will also gain insight into the real-world applications of operating systems in diverse fields, enhancing their appreciation for OS roles in resource management and system efficiency.

2. Differentiate Types of Operating Systems: Identify and describe the different types of operating systems, including multiprogramming, batch, time-sharing, single-user, multi-user, and real-time systems. This knowledge enables students to evaluate and select suitable OS models for various applications.

3. Implement Process Management Techniques: Understand process management, including process abstraction, resource allocation, and the use of threads and scheduling strategies. Students will learn different scheduling mechanisms, such as pre-emptive and non-pre-emptive, and apply them to optimize process execution in multitasking environments.

4. Master Synchronization and Deadlock Prevention: Apply synchronization techniques and process scheduling algorithms to avoid deadlocks, ensuring efficient and safe process execution. This skill is crucial for developing and maintaining systems that manage concurrent processes effectively.

5. Apply Memory Management Strategies: Learn and apply memory management techniques such as paging, segmentation, fixed and variable partitioning, and virtual memory. These methods help students manage and optimize memory resources, essential for system stability and performance.

6. Develop Skills in Shell Scripting: Gain proficiency in shell scripting within Linux environments. Students will learn to write, execute, and debug shell scripts, work with shell variables, and manage system calls, providing essential skills for automation, configuration, and system management tasks.

7. Understand System Software and Resource Abstraction: Develop an understanding of system software functions and the principles of resource abstraction, which are vital for designing efficient OS architectures that balance resource allocation and user demands.

8. Implement System Calls and OS Functions: Acquire hands-on experience with system calls and OS-level functions, which are key for interacting with hardware, managing files, and performing low-level operations. This skill is essential for roles involving system programming and OS customization.

These outcomes equip students with the knowledge and skills required to understand, design, and manage operating systems effectively, preparing them for careers in system administration, software development, and IT infrastructure management.

COMP302TH: Data Structure and File Processing

The Program Specific Outcomes (PSOs) for COMP302TH: Data Structure and File Processing aim to provide students with essential knowledge and practical skills in data structures and file organization. Upon completing this course, students will be able to:

1. Develop Skills in Data Structure Implementation: Gain proficiency in implementing core data structures, including stacks, queues, linked lists, and trees. This knowledge provides the foundation for solving complex computational problems through efficient data organization.

2. Apply Data Structures to Real-Life Problems: Utilize various data structures, such as stacks, queues, linked lists, and binary trees, to solve practical software challenges. This outcome helps students understand the importance of choosing the right data structure for specific applications.

3. Master Searching and Memory Management Algorithms: Implement fundamental algorithms for searching and memory management, including linear and binary search techniques. Students will also learn garbage collection algorithms and storage allocation for managing memory in systems.

4. Understand Physical Storage and File System Operations: Develop an understanding of physical storage devices such as disks and tapes, including their characteristics and I/O buffering mechanisms. This enables students to manage data storage and retrieval effectively, essential for large-scale data processing tasks.

5. Gain Knowledge of File Organization Techniques: Learn various file organization methods, such as sequential, indexed sequential, direct, inverted, and multi-list organization. This prepares students to handle data organization tasks that optimize data access speed and efficiency.

6. Implement Indexing Using B-trees and B+ Trees: Understand and apply indexing structures like B-trees and B+ trees, which are critical for efficient data retrieval in databases and file systems. This skill is particularly useful for managing large datasets in a structured and accessible format.

7. Develop File System Operations Skills: Perform basic file system operations such as creating, opening, closing, extending, deleting files, and reading/writing data blocks. Students will also learn about file protection mechanisms, essential for ensuring data integrity and security in file handling.

8. Hands-On Programming with Data Structures: Through lab exercises, students will implement operations on stacks, queues, linked lists, binary trees, and apply search techniques. These practical skills ensure that students can work with data structures and file systems effectively in real-world applications.

These outcomes equip students with a solid foundation in data structures, algorithms, and file processing, preparing them for careers in software development, data management, and systems programming. The skills gained are also essential for advanced studies in algorithms, database management, and data science.

Skill Enhancement Course(SEC)

COMP203TH: PHP Programming

The Program Specific Outcomes (PSOs) for the Skill Enhancement Course (SEC) COMP203TH: PHP Programming aim to equip students with essential skills in PHP programming, particularly for web development and server-side scripting. Upon completing this course, students will be able to:

1. Understand PHP Syntax and Basic Concepts: Gain a foundational understanding of PHP syntax, data types, variables, and operators, which are essential for writing and debugging PHP scripts. This forms the basis for all subsequent work in PHP programming.

2. Develop PHP Scripts to Handle HTML Forms: Learn to handle HTML form data using PHP, including using `GET` and `POST` methods to capture and process user inputs. Students will also learn to manage multi-value fields and redirect form submissions, an essential skill for creating dynamic, interactive web applications.

3. Implement Conditional Statements and Loops in PHP: Use conditional statements (e.g., `if-else`, `switch`) and loops (`for`, `while`, `do-while`) to control the flow of PHP scripts. This enables students to develop flexible, user-responsive web applications with efficient logic control.

4. Create Functions for Modular Programming: Understand the importance of functions in PHP for organizing code, managing scope, and reusability. Students will learn to declare and call functions, use arguments, and apply both global and local scopes, which are critical for modular and maintainable code.

5. Work with Arrays and Array Manipulation: Develop proficiency in creating and manipulating arrays, including associative arrays. Students will be able to use array-related library functions and loops like `foreach()` to handle data structures, making PHP scripts more powerful and flexible.

6. Perform String Manipulation and Use Regular Expressions: Learn string manipulation techniques and apply regular expressions (`preg_match()`, `preg_replace()`, `preg_split()`) to search, replace, and format strings in PHP. This is essential for validating user input and managing textual data effectively in web applications.

7. Use PHP for Dynamic and Interactive Web Content: Combine PHP with HTML to create dynamic web content, laying the foundation for developing interactive, database-driven websites. Students will gain practical skills in managing content that adapts to user input and interaction.

8. Leverage PHP Libraries for Enhanced Functionality: Use PHP's extensive built-in libraries to streamline common tasks, such as data manipulation and file handling, allowing students to create more complex and feature-rich applications efficiently.

These outcomes prepare students for roles in web development and server-side programming, equipping them with the skills needed to build dynamic, interactive, and functional web applications using PHP. The course also lays the groundwork for further studies in advanced web development and backend programming.

COMP307TH: Multimedia and Applications

Program Specific Outcomes (PSOs) for the Course COMP307TH: Multimedia and Applications

Upon successful completion of this course, students will be able to:

1. Understand the Basics of Multimedia:

   - Gain a foundational understanding of multimedia concepts, its components, and diverse applications in various industries.

2. Work with Text in Multimedia:

   - Develop proficiency in utilizing text in multimedia projects, including font selection, editing, and design. Students will also learn about hypertext and hypermedia applications.

3. Handle Images in Multimedia:

   - Acquire skills in working with both still and dynamic images. This includes understanding bitmap and vector graphics, 3D drawing, color theory, image file formats, and the application of images in multimedia projects.

4. Work with Sound:

- Understand digital and MIDI audio concepts, their differences, and the various audio file formats. Students will be able to work with sound elements in multimedia applications, including editing and integrating audio effectively.

5. Work with Video:

- Master the techniques for handling video in multimedia projects, including knowledge of analog vs. digital video, video file formats, and video shooting and editing processes.

6. Create and Utilize Animation:

- Learn animation principles, techniques, and formats to create dynamic and engaging multimedia content. Students will be able to design and edit animations for various applications.

These outcomes will equip students with a comprehensive skill set to engage in multimedia creation and application development.

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Programme Specific Outcomes (Mathematics)

By the end of the program UG in Mathematics, the student will be able to:

1) Demonstrate in-depth knowledge in one of the foundational areas of the mathematical sciences.
2) Think in a critical manner.
3) Know when there is a need for information, to be able to identify, locate, evaluate, and effectively use that information for the issue or problem at hand. Formulate and develop mathematical arguments in a logical manner.
4) Acquire good knowledge and understanding in advanced areas of mathematics and statistics, chosen by the student from the given courses.
5) Understand, formulate and use quantitative models arising in mathematical science and other contexts.

B.A./B.Sc. FIRST YEAR

Differential calculus (MATH101TH)

1) Able to define the basic concepts and principles of neighborhood of a point and limits.
2) Able to define the basic concepts and principles of differential calculus of real functions.
3) Interpret the geometric meaning of differential calculus.
4) Apply the concept and principles of differential calculus to solve geometric and physical problems.
5) Analyze the properties of functions in daily life.
6) Organize solving of complex problems by combining the acquired mathematical concepts and principles.

Differential equations (MATH102TH)

1) Delight the solution of differential equations of the first order and of the first degree by variables separable, Homogeneous and Non-Homogeneous methods.
2) Find a solution of differential equations of the first order and of a degree higher than the first by using methods of solvable for p, x and y.

3) Compute all the solutions of second and higher order linear differential equations with constant coefficients, linear equations with variable coefficients.

4) Solve simultaneous linear equations with constant coefficients and total differential equations.

5) Student will be able to solve first order differential equations utilizing the standard techniques for separable, exact, linear, homogeneous, or Bernoulli cases.

6) Find the complete solution of a non-homogeneous differential equation as a linear combination of the complementary function and a particular solution.

7) Working knowledge of basic application problems described by second order linear differential equations with constant coefficients.

B.A./B.Sc. SECOND YEAR

Real Analysis (MATH201TH)

1) Describe fundamental properties of the real numbers that lead to the formal development of real analysis comprehend rigorous arguments developing the theory underpinning real analysis.

2) Demonstrate an understanding of limits and different tests and how they are used in sequences and series.

3) Construct rigorous mathematical proofs of basic results in real analysis.

4) Appreciate how abstract ideas and rigorous tests in real analysis can be applied to important practical problems in daily life.

Algebra (MATH202TH)

1) Able to define subgroup, center and normalizer of a subgroup.

2) Able to define cycles and transpositions of a given permutations.

3) Able to prove Lagrange's theorem, Euler's theorem and Fermat's theorem.

4) Able to define cyclic groups.

5) Critical approach to get a group has no proper subgroup if it is cyclic group of prime order.

6) Able to define normal subgroups, quotient groups and index of a subgroup.

7) Able to define homomorphism, kernel of a homomorphism, isomorphism.

8) Able to define Cayley's theorem, the fundamental theorem of homomorphism for groups.

9) Able to define ring, zero divisors of a ring, integral domain, field and proof of theorems.

Integral Calculus (MATH309TH)

10) Basic concepts and principles of integrals calculus of real functions.

11) Interpret the geometric meaning of integral calculus.

12) Apply the concept and principles of integral calculus to solve geometric and physical problems.

13) Understand the basic concepts of reduction formulae.

14) Able to define the basic concepts of length, rectification, area and volumes.

Vector calculus (MATH310TH)

1) Define scalars, vectors, dot product, cross product and triple product of vectors.

2) Analyse vector functions to find limits, derivatives, tangent lines and integrals.

3) Compute limits and derivatives of functions of two or three variables.

4) Differentiate vector fields.

5) Evaluate line integrals, surface area, surface integrals and volume integrals.

6) Calculate work, circulation, flux and determine gradient vector fields.

B.A./B.Sc. THIRD YEAR

Matrices (MATH301TH)

1) Able to introduce the role of vector spaces and subspaces in daily life.
2) Use essential techniques for the study of systems of Linear equations, matrix algebra, and vector space.
3) Ability to understand the eigenvalues and eigenvectors.
4) Able to understand the basic role of orthogonality and diagonalization.

Numerical methods (MATH304TH)

1) Define Basic concepts of operators Δ, E, ∇.
2) Find the difference of polynomial.
3) Solve problems using Newton forward formula and Newton backward formula.
4) Derive Gauss's formula and Stirling formula using Newton forward formula and Newton
5) backward formula. Find maxima and minima for differential difference equation.
6) Derive Simpson's 1/3 ,3/8 rules using trapezoidal rule.
7) Find the solution of the first order and second order equation with constant coefficient.
8) Find the summation of series finite difference technique.
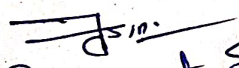9) Find the solution of ordinary differential equation of first by Euler, Taylor and Runge-Kutta Methods.
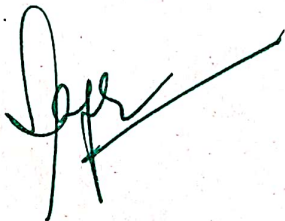
Probability and Statistics (MATH313TH)

1) Basic probability axioms and rules and the moments of discrete and continuous random variables as well as be familiar with common named discrete and continuous random variables.
2) Able to define Probability, Conditional probability. Derive Baye's theorem.
3) How to derive the probability density function of transformations of random variables and use these techniques to generate data from various distributions.
4) How to calculate probabilities, and derive the marginal and conditional distributions of bivariate random variables.

5) Methods of finding the probability distributions by Binomial, Poisson's and Normal distributions.

6) How to calculate probabilities of absorption and mathematical expectation.

Transportation and Game Theory (MATH317TH)

1) Able to understand the concepts of transportation to how to get maximum profit and minimum cost by using North West Corner method, Least cost entry method and Vogel's approximation method.

2) Able to understand the concept of assignment to how get assignment as per their work and capacity by Hungarian's method.

3) The course deals with Mathematical game theory. The game theory became a popular tool for analyzing of intelligent entities in many situations of competition or cooperation. Students will go through basic terminology of games by the mechanism of their playing (sequential, strategic), by distribution of payoffs in a game (zero/nonzero sum games), by possible cooperation of players (cooperative, non-cooperative) and also by state of information in a game (complete/incomplete information).

4) The games will be extended with possible repetition of moves (repeated games) by different methods and its effect to player's behavior.

Jaswant Sinav
AP in Mathematics

Principal
Govt. College Nalagarh
Distt. Solan (H.P.)

(Dr. Naresh Kumar)
Assistant Professor

Core Papers:

PHYS101TH- Mechanics: The students would learn about the behaviour of physical bodies it provides the basic concepts related to the motion of all the objects around us in our daily life. The course builds afoundation of various applied field in science and technology; especially in the field of mechanical engineering. The course comprises of the study vectors, laws of motion, momentum, energy, rotational motion, gravitation, fluids, elasticity and special relativity.

LAB: Students would perform basic experiments related to mechanics and also get familiar with various measuring instruments would learn the importance of accuracy of measurements.

PHYS 102 TH - Electricity, Magnetism And EMT: It gives an opportunity for the students to learn about one of the fundamental interactions of electricity and magnetism, both as separate phenomena and as a singular electromagnetic force. The course contains vector analysis, electrostatics, magnetism, electromagnetic induction and Maxwell's equations. The course is very useful for the students in almost every branch of science and engineering.

LAB: Students would gain practical knowledge about electricity and magnetism and measurements such as: Resistance, Voltage, current etc.

LAB: Students would gain practical knowledge about heat and radiation, thermodynamics, thermo emf   RTD etc. and perform various experiments.

PHYS202-Vibrations and Waves: The course comprises of the study of superposition of harmonic oscillations, waves motion (general), oscillators, sound, wave optics, interference, diffraction, polarization. The course is important for the students to make their career in various branches of science and engineering, especially in the field of photonic engineering.

LAB: The practical knowledge of wave motion doing experiments: Tuning fork,

electric vibrations. They would also learn optical phenomena such as interference, diffraction and dispersion and do experiments related to optical devices: Prism, grating, spectrometers

PHYS201TH: Statistical and Thermodymical Physics: The course makes the students able to understand the basic physics of heat and temperature and their relation with energy, work, radiation and matter. The students also learn how laws of thermodynamics are used in a heat engine to transform heat into work. The course contains the study of laws of thermodynamics, thermodynamic description of systems, thermodynamic potentials, kinetic theory of gases, theory of radiation and statistical mechanics.

PHYS203TH(SEC-I) Physics workshop skills:- The students will learn practical knowledge of instruments and they will use it in Industrial working after studies.

PHYS204(SEC-II) Electrical Circuits and Network Skills:- The students will learn a lot about daily life electrical circuits and practical knowledge of these gadgets. They will also be in a position to use it for higher studies.

PHYS301TH: Elements of Modern Physics: Photo electric effect, Compton effect and equations of matter regarding information is given to students and they will solve higher order differential equations of higher Mathematics. They will also learn difference between classical and quantum mechanics.

PHYS307TH Radiation safety:- The students will learn the hazards of radiations in nuclear physics and they will get information regarding preventive measure to counter these radiations.

PHYS304TH Nuclear and particle physics:- The students will know the general properties of nuclei and different models like liquid drop model and shell model to understand nuclei. The students will acquire knowledge about particle physics.

PHY310TH: Renewable Energy and Energy Harvesting :- The students will get information about renewable and non renewable sources of energy. They will also help the people to get sanitize about problems of nature.

B. Sc. PHYSICS

PROGRAMME SPECIFIC OUTCOMES: This undergraduate course in Physics Would provide the opportunity to the students:

- To understand the basic laws and explore the fundamental concepts of physics
- To understand the concepts and significance of the various physical phenomena.
- To carry out experiments to understand the laws and concepts of Physics.
- To apply the theories learnt and the skills acquired to solve real time problems.
- To acquire a wide range of problem solving skills, both analytical and technical and to apply them.
- To enhance the student's academic abilities, personal qualities and transferable skills this will give them an opportunity to develop as responsible citizens.
- To produce graduates who excel in the competencies and values required for leadership to serve a rapidly evolving global community.
- To motivate the students to pursue PG courses in reputed institutions.
- This course introduces students to the methods of experimental physics. Emphasis will be given on laboratory techniques specially the importance of accuracy of measurements.
- Providing a hands-on learning experience such as in measuring the basic concepts in properties of matter, heat, optics, electricity and electronics.

PHYS 302TH(SEC-I) Physics workshop skills:- The students will learn practical knowledge of instruments and they will use it in Industrial working after studies.

PHYS304(SEC-II) Electrical Circuits and Network Skills:- The students will learn a lot about daily life electrical circuits and practical knowledge of these gadgets. They will also be in a position to use it for higher studies.

PHY0 401TH- Waves and Vibrations: The course comprises of the study of superposition of

harmonic oscillations, waves motion (general), oscillators, sound, wave optics, interference, diffraction, polarization. The course is important for the students to make their career in various branches of science and engineering, especially in the field of photonic engineering.

LAB: The practical knowledge of wave motion doing experiments: Tuning fork, electric vibrations. They would also learn optical phenomena such as interference, diffraction and dispersion and do experiments related to optical devices: Prism, grating, spectrometers

PHYS501TH: Elements of Modern Physics: Photo electric effect, Compton effect and equations of matter regarding information is given to students and they will solve higher order differential equations of higher Mathematics. They will also learn difference between classical and quantum mechanics.

PHYS502TH: Mathematical Physics: Students would be able to understand the mathematical methods essential for solving the advanced problems in physics. It would be helpful in the development of the ability to apply the mathematical concepts and techniques to solve the problems in theoretical and experimental physics. The knowledge of mathematical physics would be beneficial in further research and development as it serve as a tool in almost every branch of science and engineering

PHYS506TH Radiation safety:- The students will learn the hazards of radiations in nuclear physics and they will get information regarding preventive measure to counter these radiations.

PHYS601TH Nuclear and particle physics:- The students will know the general properties of nuclei and different models like liquid drop model and shell model to understand nuclei. The students will acquire knowledge about particle physics.

PHYS602TH Quantum Mechanics:- Photo electric effect, Compton effect and equations of matter regarding information is given to students and they will solve higher order differential equations of higher Mathematics. They will also learn difference between classical and quantum mechanics
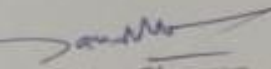
PHYS607TH: Renewable Sources of Energy :- The students will get information about renewable and non renewable sources of energy. They will also help the people to get sanitize about problems of nature.
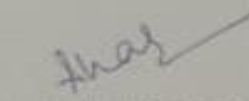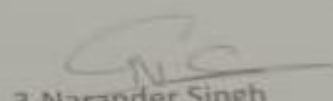
B.Sc.PHYSICS

PROGRAMME SPECIFIC OUTCOMES: This undergraduate course in Physics Would provide theopportunity to thestudents:

- To understandthe basiclawsandexplorethefundamentalconceptsofphysics
- Tounderstandtheconceptsandsignificanceofthevariousphysicalph enomena.
- To carryoutexperimentsto understandthelaws andconceptsofPhysics.
- Toapplythetheorieslearntandtheskillsacquiredtosolve realtimeproblems.
- To acquire a wide range of problem solving skills, both analytical and technical and toapplythem.
- To enhance the student's academic abilities, personal qualities and transferable skillsthiswill give themanopportunity todevelopasresponsiblecitizens.
- To produce graduates who excel in the competencies and values required for leadershipto servea rapidlyevolvingglobal community.
- TomotivatethestudentstopursuePGcoursesinreputedinstitutions.
- This course introduces students to the methods of experimental physics. Emphasis willbe given on laboratory techniques specially the importance ofaccuracy ofmeasurements.
- Providing a hands-on learning experience such as in measuring the basic concepts inpropertiesofmatter, heat,optics,electricity andelectronics.

Signature of teachers

1.Sanjay Sharma

2.Shalini Sharma

3.Narander Singh

Principal
Govt. College Nalagarh
Distr. ....

COURSE LEARNING OUTCOMES

CLASS	PROGRAMME	COURSE STUDY OUTCOMES
BSc.III	ANIMAL BIOTECHNOLGY ZOOL 302 (A)	The students will to be able to use or demonstrate the basic techniques of biotechnology like DNA isolation, PCR, transformation, restriction digestion etc., Ethical and social issues regarding GMOs and designing a project for research for successful implementation of the ideas and develop solutions to solve problems related to biotechnology keeping in mind safety factor for environment and society.
	REPRODUCTIVE BIOLOGY ZOOL 302 (C)	The students will to be able to describe the basic reproductive system mechanisms, and Students can reproductive biology; hormonal changes, various reproductive disorders, reproductive technologies along with their social and ethical aspects of reproductive technologies and research and reproductive health.
	SERICULTURE ZOOL 303	The students will to be able to recognize various species of silk moths in India, and exotic and indigenous races, the opportunities and employment in sericulture industry- in public, private and government sector.
	AQUARIUM FISH KEEPING ZOOL 304 (A)	The students will to be able to recognize different kinds of fish (commercial, decorative and of scientific studies) their compatibility in aquarium.
BSc.II	PHYSIOLGY AND BIOCHEMISTRY ZOOL 201	The students will to be able to know basic human physiology and correlate with histological structures, Understand how animals maintain an internal homeostatic state in response to changes in their external environment and interdependence of physiological and biomolecules, essentials of the metabolic pathways along with their regulation. Become aware about classical laboratory techniques, use modern instrumentation, design and conduct scientific experiments and analyze the resulting data.
	GENETICS AND EVLUTOINARY BIOLOGY ZOOL 202	The students will to be able to gain knowledge of the basic principles of inheritance, analyze pedigree leading to development of analytical skills and critical thinking, mechanisms of mutations, the causative agents and the harmful impact of various chemicals and drugs being used in day to day life. Gain knowledge about the relationship of the evolution of various species and the environment they live in. Get motivated to work towards mitigating climate change so that well adapted species do not face extinction as a result of sudden drastic changes in environment. Use knowledge gained from study of variations, genetic drift to ensure that conservation efforts for small threatened populations are focused in right direction. Predict the practical implication of various evolutionary forces acting on the human population in the field of human health, agriculture and wildlife conservation.
	MEDICAL DIAGNOSTICS ZOOL 203	The students will to be able to gain knowledge about various infectious, non-infectious and lifestyle diseases, tumors and their diagnosis. Develop their skills in various types of tests and staining procedure involved in hematology, clinical biochemistry and will know the basics of instrument handling. Learn scientific approaches/techniques used in the clinical laboratories to

		investigate Various diseases and will be skilled to work in research laboratories. Gain knowledge about common imaging technologies and their utility in the clinic to diagnose a specific disease.
	APICULTURE ZOOL 204	The students will learn about the various species of honey bees in India, their social organization and Importance. Be aware about the opportunities and employment in apiculture- in public, private and Government sector. Gain thorough knowledge about the techniques involved in bee keeping and honey production. Know about various products obtained from beekeeping sector and their importance. Develop entrepreneurial skills necessary for self-employment in beekeeping sector.
BSc.I	ANIMAL DIVERSITY ZOOL 101	The students will to be able to understand about the importance of systematics, taxonomy and structural organization of animals living in diverse habitats and explore evolutionary history and relationships of different non chordates and chordates, through practical sessions, team work, group discussions, assignments and projects. Comprehend the circulatory, nervous and skeletal system of chordates.
	COMPARATIVE ANATOMY AND DEVELPMENT BIOLOGY OF VERTEBRATES ZOOL 102	The students will to be able to explain comparative account of the different vertebrate systems, pattern of vertebrate evolution, organization and functions of various systems. Understand the events that lead to formation of a multicellular organism from a single fertilized egg, the zygote. Describe the general patterns and sequential developmental stages during embryogenesis; and understand how the developmental processes lead to establishment of body plan of multicellular organisms.