Criterion – 2

Teaching-Learning and Evaluation

NAAC- SSR (2nd Cycle)

ETERNAL UNIVERSITY

BARU SAHIB, SIRMOUR-173101
HIMACHAL PRADESH

2.6.1(1)

Program and Course outcomes-I

ETERNAL UNIVERSITY
BARU SAHIB, SIRMOUR-173101
HIMACHAL PRADESH

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Programme outcomes, Programme specific outcomes and course outcomes

Ph.D. Horticulture (Vegetable Science)

Programme Outcome	**1.** After doing Ph.D. in Horticulture (Vegetable Science) the student becomes eligible to be appropriate for employment offered by Agricultural universities for distinct posts from the concerned field of their specialization as Assistant Professor, Scientist, quality control officer, farm manager, breeder, seed analyst etc. **2.** Indian Council of Agricultural Research and Department of Science and Technology (DST) also engage students in different posts according to their requirement.
Programme specific outcomes	**1.** Students having a combined knowledge of Vegetable Science with entrepreneurial skills enable them to get administrative or marketing positions with organizations involved in the processing and marketing of vegetables, they also get recruited in the companies as horticulturists, gardeners, supervisors, farm or estate managers, handling large scale production of certain varieties of vegetables in various private seed companies etc. **2.** Many fertilizer and pesticide companies engage students in their firms where they work as managers. **3.** At the International level, different agencies appoint horticultural consultants. **4.** And other different positions as per their requirement.
Course Ph.D Horticulture (Vegetable Science) Outcomes	
VSC-601(Advances in Vegetable Production)	❖ This course will keep the students up to date on the latest advancements and trends in vegetable crop production technologies. ❖ Students will be able to classify vegetables according to their climatic suitability by season and examine various cropping methods in a variety of settings. ❖ Utilize their expertise of vegetable growing to meet the needs of industry, as well as manage and recycle vegetable waste.
VSC-602(Advances in Breeding of Vegetable Crops)	❖ It contains current information on contemporary research trends in the field of vegetable crop breeding, with a focus on tropical, subtropical, and temperate vegetables grown in India. ❖ Students will be able to describe the ideas and procedures used in vegetable crop breeding after taking this course. ❖ Identify constructive ways in hybrid seed development by discussing breeding strategies and achievements in vegetable crops. ❖ Apply advanced breeding techniques to vegetable crops.
VSC-603 (Protected Cultivation of Vegetable Crops)	❖ It will provide students with the most up-to-date information on growing vegetable crops in protected environments, as well as establish the core concept of protected farming. ❖ Examine the various forms of protected structures. ❖ Manage the crops that are grown in enclosed structures. ❖ Describe how environmental conditions affect the growth of vegetable crops and to develop knowledge on how to cultivate vegetables in a protected environment and to plan an integrated disease and pest management programme in a protected structure.
VSC-604 (Biotechnology of Vegetable Crops)	❖ Advances in biotechnology for vegetable crop development are covered in this course which will enable the students to show the establishment of tissue grown plants after completing this course. ❖ Demonstrate how tissue culture can be used to grow vegetable crops.

	❖ Describe how biotechnology is used in vegetable crops. ❖ Develop horticultural agricultural biotechnology abilities and discuss the role of molecular markers and recombinant DNA technology.
VSC-605 (Seed Certification, Processing and Storage of Vegetable Crops)	❖ The students will be acquainted with importance of quality seed production, various methods of seed production in self and open pollinated vegetable crops their storage and certification.
VSC-606 (Abiotic Stress Management in Vegetable Crops)	❖ It will keep the students up to date on the latest research in the field of horticultural crop biotic and abiotic stress management. ❖ Students will be able to detect several types of biotic and abiotic stress in horticultural crops after completing this course. ❖ Illustrate crop factors or causes and impact of biotic and abiotic stress. ❖ Discuss different stress management and mitigation practices of plant and to develop strategies for improvement of Horticultural Crops against stresses.
VSC-691 (Doctoral Seminar-1)	❖ Course will develop skill on review work on the background of area of research through secondary information available. ❖ Through this course students will be able to define applications of given topics. ❖ Integrate the concept developed during study with situations given and observe the situations provided and develop the presentation. ❖ Demonstrate the finding of study carried out.
VSC-692 (Doctoral Seminar-2)	❖ Describe suitable review of literatures related to research parameters. ❖ Tabulate the available information for reflecting the outcomes.

Program Outcome and Program Specific outcome of B.Sc. (Hons.) Agriculture Program

Program Outcome	This program enables the students to acquire comprehensive knowledge in the different aspects of agriculture and its allied fields. It makes the student self-reliant to carry out all agriculture practices on her own, also to initiate small startup in her field of choice and earn her livelihood.
Program Specific Outcome	The student during this program has many options to drive her career in her desired field. She has the options to sharp her skills in the field of Seed Technology, Commercial Horticulture, Food Processing, Apiculture, Bioagents and Biofertilizers, Organic Production Technology, Floriculture and Landscaping, Waste Management. The students learn about these modules in a very comprehensive manner and can play lead roles in the field of Agriculture or as an entrepreneur.
B.Sc. (Hons.) Agriculture	
Agronomy	In this aspect of agriculture, the student learns to practice different agronomical parameters of various crops such as seeds and sowing, tillage, crop density and geometry, nutrient use efficiency, irrigation and logging.
Genetics & Plant Breeding	In this area of agriculture study the various strategies about crop improvement. They also learn field exercises such as emasculation, pollination and bagging.
Soil Science & Agricultural Chemistry	In this the students learn various soil aspects such as soil genesis, soil profile, soil physical properties, soil taxonomy and soil reactions.
Entomology	This subject provides students detailed account of insects such as insect morphology, ecology, classification and integrated pest management.
Agricultural Economics	The student learns various economical aspects of agriculture. It learns meaning, scope and subject matter, definitions, activities, approaches to economic analysis; micro and macroeconomics.
Agricultural Engineering	In this subject the student learns about different engineering practices related to soil and water conservation, farm and power machinery & renewable and green technology.
Plant Pathology	In this aspect the student studies various plant pathogens such as bacteria/mollicutes, fungi, virus, nematodes, their life cycle along with their eradication strategies in agricultural and horticultural crops.
Horticulture	The students, in this aspect, learn about different productions technologies in fruit and plantation crops, vegetable & spices, ornamental, medicinal & aromatic plants (MAPs) and landscaping.
Food Science	In this aspect the student learns about food chemistry,

	composition, microbiology, processing, preservation, and nutrition and energy metabolism.
Agricultural Extension	This subject gives comprehensive knowledge regarding extension education such as community development, rural development, rural leadership, ICT application, models and barriers to communication.
NSS/NCC/Physical Education & Yoga Practices	These courses evoke social consciousness among students through various activities viz., working together, constructive and creative social work, to be skillful in executing democratic leadership, developing skill in programme development to be able for self-employment, reducing gap between educated and uneducated, increasing awareness and desire to help sections of society.
Rural Agriculture Work Experience (RAWE)	Rural Agriculture Work Experience also enables the students to gain rural experience giving them confidence and enhancing on-farm problem solving abilities in real life situations especially in contact with farmers, growers, and other stakeholders. In-plant Training for a short period of time in relevant industry helps gain the knowledge and experience of the work culture. In-plant Training by reputed organizations either MNCs or organized sectors provide an industrial exposure to the students as well as helps develop their career in high tech industrial requirements. Skill Development component includes use of Agriculture Systems & devices for enhancing functional skill. It is expected that basic infrastructure and Experiential Learning Unit available in universities may help in boosting livelihood-ensuring opportunities. Student Project is essential for students interested in higher education. Through this component, they will know how to identify research problem, create experimental set up and to write report.
Rural Entrepreneurship Awareness Development Yojana (READY)	Experiential Learning helps the student to develop competence, capability, capacity building, acquiring skills, expertise, and confidence to start their own enterprise and turn job creators instead of job seekers. This embraces the earning while learning concept. Experiential Learning is a major step forward for high quality professional competence, practical work experience in real life situation to graduates, production-oriented courses, production to consumption project working, facilitates producing job providers rather than job seekers and inculcates entrepreneurial orientation.
Course Outcomes	**Courses offered in Semester I**
Course code: Agron-101 Course Title: Agricultural Heritage"	**Outcomes**

CO1	Describe general Introduction of agriculture.
CO2	Give the history of agricultural development
CO3	Describe ancient India agriculture in civilization era
CO4	Describe assets and contrasting trends & agricultural growth
CO5	Identified liabilities: Soil factors, weather factors
CO6	Describe multifaceted roles and tasks of women in agriculture
CO7	Describe empowerment of women & group dynamics
CO8	Identified the nucleus of agricultural extension and training
Course code: Soil-101 Course Title: "Fundamentals of soil science"	**Outcomes**
CO1	Give the pedological and edaphological concepts
CO2	Classify Composition: rocks and minerals weathering
CO3	Identify Soil profile, soil physical properties, soil texture
CO4	Study soil compaction & soil color
CO5	Identify soil water, retention and potentials
CO6	Describe soil colloids, properties, nature, types and significance
CO7	Classify soil organic matter, composition, decomposability
Course code: Eng-101 Course Title: "Comprehension and communication skills in English"	**Outcomes**
CO1	Study the English Comprehension
CO2	Describe War minus shooting
CO3	Study A Dilemma: A layman looks at science Raymond B
CO4	Describe You and your English
CO5	Improve Written skills
CO6	Improve The style, importance of professional writing
Course code: BT-101 Course Title: "Fundamentals of Biochemistry and Biotechnology"	**Outcomes**
CO1	Study Scope and importance of biochemistry in agriculture
CO2	Identify Structure, properties and functions of amino acids
CO3	Write classification, structure and functions of Lipids
CO4	Write Classification, structure and functions of carbohydrates
CO5	Study Metabolism: basic concepts, glycolysis & citric acid cycle
CO6	Describe the central dogma of life; DNA replication
CO7	Study structure and biological functions of vitamins
Course code: Agron-102 Course Title: "Fundamentals of	**Outcomes**

Agronomy"	
CO1	Study meaning and scope of agronomy
CO2	Planting geometry and its effect on growth and yield
CO3	Study agricultural meteorology: weather and climate
CO4	Study earth's atmosphere, composition and structure
CO5	Identify atmospheric, temperature, factors affecting air pressure
CO6	Write wind: factors affecting, cyclones and anticyclones
CO7	Describe process of condensation, formation of dew & fog
Course code: Bot-101 Course Title: "Introductory Biology"	**Outcomes**
CO1	Classify and introduction to different groups of the plant kingdom
CO2	Study morphology: Structure of seeds of different plants
CO3	Identify roots: External characters and functions
CO4	Identify stem: External characters and functions
CO5	Identify leaf: Parts of a typical leaf and their functions
CO6	Identify inflorescence: Elementary knowledge of simple and special types
CO7	Identify pollination: Types of pollinations, agencies responsible for pollination
CO8	Study reproduction in plants: Vegetative, and sexual
Course code: Math-101 Course Title: "Elementary Mathematics"	**Outcomes**
CO1	Understand mensuration of rectangles
CO2	Study volumes of cubes and rectangular solids
CO3	Study algebra: Solution of quadratic equations
CO4	Study algebra: Series: nth terms sum to n terms of an AP and GP
CO5	Understand co-ordinate geometry
Course code: Edu-101 Course Title: "Human values & ethics"	**Outcomes**
CO1	Understand the need, basic guidelines of value education
CO2	Understand the human being as co-existence of self
CO3	Study basis for universal human values and ethical human conduct
CO4	Understand professional ethics, issues in professional ethics
CO5	Study the holistic criteria for evaluation, case studies of typical holistic technologies
Course Code: Forst-101 Course Title: Introduction to forestry	**Outcomes**
CO1	Write about the forestry- definition, scope and important terminology
CO2	Classify Status of forests in India and their role
CO3	Write down the National and International forestry organizations

CO4	Write down the Locality factors: climatic, edaphic, topographical and biotic
CO5	Describe choice of species w.r.t site/economic uses and constraints of tree growing
CO6	Identify the Forest management: growing stock, normal forest
CO7	Write down the Forest utilization major and minor forest products
Course Code: Ext-101 Course Title: Rural sociology and educational psychology	**Outcomes**
CO1	Describe extension education and agricultural extension: meaning, definition, scope and importance
CO2	Explain Indian rural society, important characteristics, differences and relationship between rural and urban societies
CO3	Describe Social Stratification: meaning, definition, functions, basis for stratification
CO4	Write down Social values and attitudes: Meaning, definition, types and role of social values and attitudes in agricultural extension
CO5	Describe Social Control: meaning, definition, need of social control and means of social control
CO6	Identify Leadership: meaning, definition, classification, roles of a leader, different methods of selection of professional and lay leaders
CO7	Write down psychology and educational psychology: meaning, definition,
	Scope and importance
CO8	Personality: meaning, definition, types, factors influencing the personality and role of personality in agricultural extension
Course code: HORT-101; Course Title: Fundamentals of Horticulture	**Outcomes**
CO1	Give different methods of plant propagation.
CO2	Give principles of orchard establishment.
CO3	What is unfruitfulness?
CO4	What is the importance of plant bio regulators?
	Enumerate different irrigation methods and fertilizers for horticulture crops?
Course Outcomes	**Courses offered in Semester II**
Course code: Econ102 Course Title: Fundamental of Agricultural Economics"	**Outcomes**

CO1	Understand economics: meaning, definition, subject matter
CO2	Study wants: Meaning, characteristics, classifications of wants
CO3	Study consumer's surplus: Meaning, definition, importance
CO4	Understand elasticity of demand: Types of elasticity of demand
CO5	Study welfare economics: meaning, pareto's optimality
CO6	Study public finance: Meaning, principles
CO7	Understand classification of taxes: Cannons of taxation
Course code: PBG-102 Course Title: "Fundamentals of Genetics"	**Outcomes: Describe general principles of genetics**
CO1	Study Mendel's laws of inheritance and exceptions to the laws
CO2	Significance and differences between mitosis and meiosis
CO3	Describe crossing over and factors affecting crossing over
CO4	Describe characteristic features of cytoplasmic inheritance
CO5	Identify DNA and its structure, function, types
CO6	Write Gene expression and differential gene activation Co7 Evolution of different crop species like cotton, wheat
Course code: Bot-102 Course Title: Fundamentals of Crop physiology"	**Outcomes**
CO1	Give Introduction, importance in agriculture
CO2	Study Seed viability and vigor
CO3	Classify monocarpic and polycarpic species with example
CO4	Study transpiration in relation to crop productivity
CO5	Understand Photorespiration, factors affecting photosynthesis
CO6	Study Plant growth regulators
CO7	Understand Postharvest physiology, seed dormancy
Course code: Pl PATHt102 Course Title: Fundamentals of plant pathology"	**Outcomes**
CO1	Study important plant pathogenic organisms
CO2	Study classification of prokaryotes
CO3	Write definition and objectives of plant pathology
CO4	Identify plant disease epidemiology
CO5	Study cultural methods, rouging
CO6	Understand methods of application of fungicides
CO7	Study application of biotechnology in plant
Course code: En102 Course Title: Fundamentals of Entomologic"	**Outcomes**
CO1	Give History of entomology in India

CO2	Study Structure and functions of insect cuticle and moulting
CO3	Understand structure and modifications of insect antennae
CO4	Study structure and functions of digestive, circulatory system
CO5	Study Systematics: Taxonomy, importance, history and development and binomial nomenclature
Course code: Ex102 Course Title: Fundamentals of agricultural extension and education"	**Outcomes**
CO1	Give Extension education and agricultural extension
CO2	Identify Rural development; meaning, definition
CO3	Study Community development programme
CO4	Study Panchayat raj system, meaning of democratic
CO5	Study Agricultural development programmes with reference to year of start
CO6	Study social Justice and poverty alleviation programmes
CO7	Study Women development programmes
Course code: S OIL-102 Course Title: Soil and Water Conservation engineering	**Outcomes**
CO1	Identify Surveying: survey equipment, chain survey
CO2	Understand Levelling-levelling equipment, terminology
CO3	Study Irrigation, classification of projects
CO4	Understand water conveyance systems
CO5	Study drip and sprinkle irrigation systems
CO6	Study water source, water lifting devices
CO7	Study soil and water conservation
Course code: Micro-102 Course Title: "Principles of Microbiology"	**Outcomes**
CO1	Give the history of microbiology
CO2	Study metabolism in bacteria
CO3	Identify bacteriophages: structure and properties
CO4	Describe genetic recombination and bacterial genetics
CO5	Study soil microbiology & microbial groups in soil
CO6	Identify microbiology of water & microbiology of food
CO7	Classify beneficial microorganisms in agriculture
Course code: ENG-102 Course Title: Communication skills and personality development	**Outcomes**
CO1	What is verbal and non-verbal communication?
CO2	What is reading and comprehension of general and technical

	articles.
CO3	What do you understand by oral and writing skills?
CO4	What do you understand by footnotes and bibliography
Course Outcomes	**Courses offered in Semester III**
Course code: Agron-201 Course Title: Crop Production Technology -I Kharif)"	**Outcomes**
CO1	Give geographic distribution, economic importance of kharif crops
CO2	Study soil and climatic requirement, varieties, cultural practices
CO3	Study yield of kharif crops, oilseeds: groundnut, sesame
CO4	Study yield of kharif crops, fiber crops, cotton, jute
CO5	Identify forage crops, sorghum, maize, cowpea, cluster bean and napier grass
Course code: AGIS-201 Course Title: Agriniformatics"	**Outcomes**
CO1	Give Introduction to computers
CO2	Understand Operating system, DOS and WINDOWS
CO3	Study GUI, desktop and its elements
CO4	Understand applications, MSWORD
CO5	Use of in-built statistical and other functions
CO6	Study Concept of database, units of database
CO7	Write Principles of programming
Course code: Econ-201 Course Title: "Agricultural finance and co-operation"	**Outcomes**
CO1	Study agricultural finance: nature and scope
CO2	Identify agricultural credit: meaning, definition, need
CO3	Give History of financing agriculture in India
CO4	Understand Assessment of crop losses
CO5	Identify Higher financing agencies
CO6	Understand Agricultural cooperation: philosophy and principles
CO7	Reorganization of cooperative credit structure in Andhra Pradesh and single window system
Course code: Hort-201 Course Title: "Production technology of vegetables and spices"	**Outcomes**
CO1	Study ash gourd, snake gourd, bottle gourd, bitter gourd and melons
CO2	Study Bulb crops-onion and garlic

CO3	Identify Tuber crops, potato, sweet potato, tapioca
CO4	Identify Leafy vegetables, Amaranthus, Palak, Gogu
CO5	Write Importance of spices
CO6	Use of trees, shrubs, climbers, palms, houseplants
Course code: STAT-201 Course Title: "Statistal Methods"	**Outcomes**
CO1	Study definition of statistics and its use and limitations
CO2	Characteristics of ideal average, arithmetic mean
CO3	Study normal distribution and its properties
CO4	Study two samples and paired t test. F test
CO5	Understand correlation and identification through scatter diagram
CO6	Study Inter-relation between 'r' and the regression coefficients
CO7	layout and analysis with equal & unequal number of observations
Course Code: Env-201 Course Title: Environmental science and disaster management	**Outcomes**
CO1	Explain scope and importance of environmental studies. Natural resources
CO2	Describe the ecosystems: definition, concept, structure and functions.
CO3	Describe biodiversity: Definition, classification, threats to biodiversity and its conservation.
CO4	Write down environmental pollution: causes, effects and control of air, water, soil
CO5	Explain disaster management, floods, earthquakes, cyclones and landslides
CO6	Write down the environment protection act, the air act, the water act, the wildlife protection.
CO7	Write down the woman and child welfare, HIV/AIDS and role of information technology on environment and human health
Course Code: LPM-201, Course Title: Livestock production and management	**Outcomes**
CO1	Describe place of livestock in the national economy
CO2	Write down Important exotic and Indian breeds of cattle, buffalo, sheep, goat
CO3	Describe milking of animals and factors affecting milk yield and composition
CO4	Write down feeding and management of calves, growing heifers and milch animals
CO5	Describe Disease control measures, sanitation and care, breeding, feeding

CO6	Write down breed characteristics of poultry, their methods of rearing, breeding, feeding and management,
CO7	Explain Cost of production of milk, economical units of cattle, buffalo, sheep, goat
Course code: FPM-201 Course Title: "Farm power and machinery"	**Outcomes**
CO1	Study farm power in India: sources, I.C engines
CO2	Identify tractors: types, selection of tractor
CO3	Study tillage implements: primary and secondary tillage implements
CO4	Study implements for intercultural operations
CO5	Identify Plant protection equipment and harvesting equipment
CO6	Identify equipment for land development and soil conservation
	Credits 1 Theory period of one hour per week over a semester
Course code: PBG-102 Course Titl: Fundamentals of Plant Breeding	**Outcomes**
CO1	Classify plants, botanical description, floral biology
CO2	Understand aims and objectives of plant breeding
CO3	Study methods of breeding-introduction and acclimatization
CO4	Understand Hybridization & types of hybridization
CO5	Identify Incompatibility and male sterility
CO6	Study Population improvement programmes
	Credits 2 Theory period of one hour per week over a semester
Course Outcomes	**Courses offered in Semester IV**
Course code: Agron-202 Course Title: Crop Production Technology-II (Rabi)"	**Outcomes**
CO1	Study Origin, geographical distribution, economic importance of Rabi crops
CO2	Study yield of Cereals: wheat, barley; Pulses: chickpea, lentil, peas
CO3	Study yield of sugar crops: sugarcane and sugar beet
CO4	Study yield of medicinal and aromatic crops such as Mentha, lemon grass
CO5	Study yield of commercial crops: potato and tobacco; forage crops: berseem
Course code: HORT-203 Course Title: "Production technology of fruit and Plantation crops"	**Outcomes**

CO1	Give Definition and importance of horticulture
CO2	Identify Climatic zones of horticulture crops
CO3	Selection of site, fencing, and wind break, planting systems
CO4	Study propagation methods and use of rootstocks
CO5	Study methods of training and pruning
CO6	Understand package of practices for the cultivation of major fruit
CO7	Understand package of practices for the cultivation of minor fruits
Course Code: RE-202 Course Title: Renewable Energy & Green Technology	**Outcomes**
CO1	Explain energy sources, introduction, classification, energy from biomass
CO2	Classify Principles of combustion, pyrolysis and gasification
CO3	Describe briquettes, types of briquetting machines, uses of briquettes, shredders
CO4	Write down the solar energy, solar flat plate and focusing plate collectors, solar air heaters
CO5	Describe solar refrigeration system, solar ponds, solar photo voltaic systems, solar lantern, solar street lights
CO6	Identify wind energy, types of wind mills, constructional details
CO7	Write down the liquid bio fuels, bio diesel and ethanol from agricultural produce
Course code: Hort-203 Course Title: " Production technology of Ornamental crops, MAP and Landscaping	**Outcomes**
	Medicinal and Plantation Crops"
CO1	What do you understand by Ornamental crops?
CO2	Study importance and cultivation technology of aromatic crops?
CO3	What is Landscaping?
CO4	Study importance and cultivation technology of medicinal plants:
CO5	Identify Importance and cultivation technology of medicinal plants: nuxvomica, solanum khasiamum,
Course Code: Soil-202 Course Title: Problematic Soil and their management	**Outcomes**
CO1	Explain Soil a water reservoir, role in water cycle
CO2	Describe Forces of water retention. Soil water potential
CO3	Describe the Soil, plant, atmosphere continuum, indices of plant water status
CO4	Write down the Soil moisture characteristics, evaporation in the presence and absence of water table

CO5	Describe Soil erosion by water - types, effects, mechanics
CO6	Identify Rain erosivity and soil erodibility. Runoff
CO7	Write down the Soil conservation measures
Course code: PBG-202 Course Title: "Principles of seed technology"	**Outcomes**
CO1	Give Introduction to seed production
CO2	Study seed production, foundation and certified seed production in maize
CO3	Identify foundation and certified seed production of tomato and brinjal
CO4	Study seed Act and Seed Act enforcement
CO5	Study seed drying: forced air seed drying
CO6	Identify establishment of seed processing plant
CO7	Study general principles of seed storage
Course Code: Agron-203 Course Title: Farming systems and sustainable agriculture	**Outcomes**
CO1	Describe sustainable agriculture, its goal and prospective
CO2	Identify land degradation and conservators of natural resources
CO3	Describe irrigation problems, waste lands and their development
CO4	Write down organic farming definition, principles and components
CO5	Describe Farming systems: definition, principles and components
CO6	Write down IFS models for wetland, irrigated dryland and dryland situations
Course Code: Econ-202 Course Title: Agricultural marketing, trade and prices	**Outcomes**
CO1	Describe agricultural marketing: concepts and definition, scope and subject matter, market and marketing
CO2	Explain producer's surplus: meaning, types of producer’s surplus, marketable surplus
CO3	Write down market integration, meaning, definition, types of market integration. marketing efficiency
CO4	Write down Theories of international trade: Domestic trade, free trade, international trade
CO5	Identify market access, domestic support, export subsidies, Exim-policy and ministerial conferences
CO6	Identify advantages of food corporation of India: Objectives and functions. quality control
CO7	Write down meaning, need for agricultural price policy. Risk in marketing, meaning and importance

Course code: Agron-204 Course Title: "Introductory Agro-meteorology and climate change	**Outcomes**
CO1	Study meaning and scope of agronomy
CO2	Planting geometry and its effect on growth and yield
CO3	Study agricultural meteorology: weather and climate
CO4	Study earth's atmosphere, composition and structure
CO5	Identify atmospheric, temperature, factors affecting air pressure
CO6	Write wind: factors affecting, cyclones and anticyclones
CO7	Describe process of condensation, formation of dew & fog
Course Outcomes	**Courses offered in Semester V**
Course Code: Ent-301 Course Title: Insect pests of crop and stored grains and their management	**Outcomes**
CO1	Classify stored grain pests: Coleopteran and lepidopteran pests, their biology
CO2	Write down distribution, biology, nature and symptoms of damage, and management strategies of insect and non-insect pests of crop plants
CO3	Write down distribution, biology, nature and symptoms of damage, and management strategies of insect and non-insect pests of cereals
CO4	Write down Distribution, biology, nature and symptoms of damage, and management strategies of insect and non-insect pests' vegetable
CO5	Write down distribution, biology, nature and symptoms of damage, and management strategies of insect and non-insect pests of fruit trees
CO6	Write down distribution, biology, nature and symptoms of damage, and management strategies of insect and non-insect pests of spices
Course Code: Agron-302 Course Title: Practical crop production I (Kharif crops)	**Outcomes**
CO1	Write crop planning, raising field crops in multiple cropping systems
CO2	Practical Field preparation, seed treatment, nursery raising, sowing, nutrient management
CO3	Practical of weed management and management of insect pests and diseases of crops

CO4	Preparation of balance sheet including cost of cultivation, net returns
Course Code: Pl. Path-302 Course Title: Disease of field & horticultural crops and their management-I	**Outcomes**
CO1	Write down economic importance, symptoms, cause, disease cycle and integrated management of diseases of fruits
CO2	Write down economic importance, symptoms, cause, disease cycle and integrated management of diseases of vegetable.
CO3	Write down economic Importance, symptoms, cause, disease cycle and integrated management of diseases of cucurbits
CO4	Study integrated management of diseases of maize, wheat
CO5	Study management of diseases of sugarcane, turmeric, tobacco
CO6	Study epidemiology and disease cycle of diseases of linseed, sesamum, sunflower
Course code: Ent-202 Course Title" Principles of integrated pest and disease management"	**Outcomes**
CO1	Study IPM; Introduction, importance, concepts principles
CO2	Identify biological methods of control (parasites, predators
CO3	Study of important insecticides
CO4	Study recent methods of pest control, repellents
CO5	Identify beneficial insects: parasites and predators used in pest control
Course code: Soil-301 Course Title: "Manures, fertilizers and Soil fertility Management"	**Outcomes**
CO1	Give Introduction, raw materials, manures
CO2	Study composts, different methods, mechanical compost plants
CO3	Understand fertilizers, classifications, manufacturing processes and properties of major nitrogenous
CO4	Study bio fertilizers and their advantage
CO5	Identify organic chemistry as prelude to agro chemicals
CO6	Study Herbicides, major classes, properties and uses of 2,4-D, atrazine
CO7	Study fungicides, major classes, properties and uses of carbendazim
Course Code: Ext-301 Course Title: Entrepreneurship development and Business Communication	**Outcomes**
CO1	Describe entrepreneurship development: assessing overall

	business environment in the Indian economy
CO2	Explain globalization and the emerging business/entrepreneurial environment.
CO3	Describe SWOT analysis, generation, incubation and commercialization of ideas and innovations
CO4	Write down export and import policies relevant to agriculture sector. Venture capital
CO5	Describe communication skills: structural and functional grammar; meaning and process of communication
CO6	Identify listening and note taking, writing skills, oral presentation skills; field diary and lab record
CO7	Write down individual and group presentations, impromptu presentation, public speaking
Course Code: Agron-302 Course Title: Practical crop production I (Kharif crops)	**Outcomes**
CO1	Write crop planning, raising field crops in multiple cropping systems
CO2	Practical Field preparation, seed treatment, nursery raising, sowing, nutrient management
CO3	Practical of weed management and management of insect pests and diseases of crops
CO4	Preparation of balance sheet including cost of cultivation, net returns
Course Code: IPR-301 Course Title: Intellectual Property Rights	**Outcomes**
CO1	What do you understand by IPR?
CO2	What is Patent?
CO3	Give different Patent systems in India.
CO4	What are the rights of TK holders?
Course Code: AGRON-301 Course Title: Geoinformatics and Nano-Technology and Precision Farming	**Outcomes**
CO1	What do you understand by precision farming?
CO2	What is crop discrimination and yield monitoring?
CO3	What is global positioning system?
CO4	What is the STCR approach for precision Agriculture?
CO5	What are the different applications of Nanotechnology in seed, water, fertilizer and plant protection?
Course Code: PBG-301 Course Title: Crop Improvement I (Kharif)	**Outcomes**

CO1	What do you understand by wild relatives of different cereals?
CO2	What is different plant genetic resources and their utilization?
CO3	Give the importance of different self and cross-pollinated cereal crops.
CO4	What are major breeding objectives and procedures?
Course Outcomes	**Courses offered in Semester VI**
Course Code: Econ-302 Course Title: Farm Management, Production & Resource Economics	**Outcomes**
CO1	Describe Production economics: Meaning, definition, nature and scope
CO2	Explain concepts of production. Production functions, meaning, definition
CO3	Describe Laws of returns: Increasing, constant and decreasing
CO4	Write down the determination of optimum input and output
CO5	Describe returns to scale: Meaning, definition, importance
CO6	Identify types and systems of farming. Farm planning and budgeting
CO7	Write down the linear programming: Assumptions, advantages and limitations
	Credits 1 Theory period of one hour per week over a semester
Course Code: Agron-304 Course Title: Practical crop production II (Rabi crops)	**Outcomes**
CO1	Write crop planning, raising field crops in multiple cropping systems
CO2	Practical Field preparation, seed treatment, nursery raising, sowing, nutrient management
CO3	Practical of weed management and management of insect pests and diseases of crops
CO4	Preparation of balance sheet including cost of cultivation, net returns
Course Code: Agron-304 Course Title: Crop residue management	**Outcomes**
CO1	Write down Significance of crop residue management
CO2	Explain challenges for diversified use of crop residue in high cropping intensity areas
CO3	Describe Crop residue in relation to agricultural ecosystems and conservation agriculture.
CO4	Write down on-site and off-site management of crop residues and soil health indicators

CO5	Describe beneficial effects of crop residue on soil health, crop yields
CO6	Write down recent technologies for conservation agriculture
CO7	Write down the Policy options for efficient residue management in Himachal
Course Code: Agron-305 Course Title: Principles of Organic farming	**Outcomes**
CO1	Describe concept and relevance of organic farming
CO2	Explain biological intensive nutrient management-organic manures
CO3	Describe Vermicomposting, green manuring, recycling of organic residues
CO4	Write down the soil improvement and amendments
CO5	Describe Integrated diseases and pest management
CO6	Explain Weed management; Quality considerations, certification,
Course Code: PBG-302 Course Title: Crop Improvement I (Rabi)	**Outcomes**
CO1	What do you understand by wild relatives of different cereals?
CO2	What is different plant genetic resources and their utilization?
CO3	Give the importance of different self- and cross-pollinated cereal crops.
CO4	What are major breeding objectives and procedures?
Course Code: FSN-302 Course Title: Principles of Food Science and Nutrition	**Outcomes**
CO1	What do you understand by pH, surface tension, colloidal systems?
CO2	Describe food composition and chemistry
CO3	What are the different methods of food preservation and processing?
CO4	What do you understand by malnutrition?
CO5	What are different new trends in food science and nutrition?
Course code: Agron-303; Course Title: Rainfed Agriculture and Watershed Management	**Outcomes**
CO1	Study Irrigation: definition and objectives
CO2	Understand Soil plant water relationships
CO3	Identify Methods of soil moisture estimation
CO4	Identify effective rainfall, scheduling of irrigation
CO5	Understand Methods of irrigation
CO6	Study Irrigation efficiency and water use efficiency

CO7	Identify water management of different crops
Course code: HORT-302; Course Title: Post-Harvest management and value addition of fruits and vegetables	**Outcomes**
CO1	Write down importance of Postharvest technology in horticultural crops.
CO2	Explain pre-harvest factors affecting quality on postharvest shelf life of fruits and vegetables
CO3	Write down methods of storage: precooling, pre-storage treatments, low temperature storage
CO4	Describe various methods of packing, packaging materials and transport. Packing technology for export
CO5	Write down importance and scope of fruit and vegetable preservation in India
CO6	Write down preparation of jams, jellies, marmalades, candies, crystallized and glazed fruits
CO7	Write down spoilage of canned products, biochemical, enzymatic and microbial spoilage
Course Code: Pl. Path-301 Course Title: Disease of field & horticultural crops and their management-II	**Outcomes**
CO1	Write down economic importance, symptoms, cause, disease cycle and integrated management of diseases of fruits
CO2	Write down economic importance, symptoms, cause, disease cycle and integrated management of diseases of vegetable.
CO3	Write down economic Importance, symptoms, cause, disease cycle and integrated management of diseases of cucurbits
CO4	Study integrated management of diseases of maize, wheat
CO5	Study management of diseases of sugarcane, turmeric, tobacco
Course Code: PCS-302 Course Title: Protected cultivation and Secondary Agriculture	**Outcomes**
CO1	Describe greenhouse technology, introduction, types of greenhouses
CO2	Write greenhouse equipment, materials of construction for traditional and low-cost green houses
CO3	Describe cost estimation and economic analysis. Choice of crops for cultivation under greenhouses
CO4	Write Growing media, soil culture, type of soil required, drainage, flooding and leaching
CO5	Describe Threshing, threshers for different crops, parts, terminology, care and maintenance

CO6	Identify drying, grain drying, types of drying, types of dryers. Storage
CO7	Write Grading, methods of grading, equipment for grading of fruits and vegetables
Course code: Ent-302; Course title: Management of Beneficial Insects	**Outcomes**
CO1	Study Insect ecology: Introduction, environment and its components
CO2	Understand concepts of balance of life in nature
CO3	Study IPM; Introduction, importance, concepts principles
CO4	Identify biological methods of control (parasites, predators
CO5	Study of important insecticides
CO6	Study recent methods of pest control, repellents
CO7	Identify beneficial insects: parasites and predators used in pest control
Course Outcomes	**Courses offered in Semester VII**
	Rural Agricultural Work Experience (RAWE)
Course Title: Village attachment	**Outcomes**
CO1	Work with villagers
CO2	Solve the problem of villagers
CO3	Soil testing of farmer field
CO4	Identification of disease and insect pest on farmer field
CO5	Suggestions to the farmer about human health
CO6	Suggestions to the farmer about child education and development
Course Title: Experiential learning	**Outcomes**
CO1	Practical on seed production at farm
CO2	Practical of food processing
CO3	Practical on disease identification and management
CO4	Practical on insect identification and management
CO5	Practical on mushroom cultivation
CO6	Practical on Post harvest technology
CO7	Practical on biofertilizer and biopesticides
Course Title: Industry attachment/KVK/Research Station	**Outcomes**
CO1	Visit to nearby industry/KVK/Research station
CO2	Learning the work culture of industry/KVK/Research station
CO3	Discussion with the workers
CO4	Identification the procedure of production.
	0 Tutorial period of one hour per week over a semester
	4 Practical period of four hour per week over a semester

Course Code: ----------, Course Title Project report preparation and examination	**Outcomes**
CO1	Daily dairy preparation
CO2	Compilation of all programmes during semester
CO3	Presentation of the report
CO4	Submission of the report
Course Outcomes	**Courses offered in Semester VIII**
	Rural Entrepreneurship Awareness development Yojana (READY)
Course Code: READY-401 Course Title: Production Technology for Bioagents and Biofertilizers	**Outcomes**
CO1	Hands on practice and knowledge about different bioagents and biofertilizers and their applications in agriculture
Course Code: READY-402 Course Title: Seed Production and Technology	**Outcomes**
CO1	Hands on practice and knowledge about different seed production stratifies and quality improvement of seeds for crop improvement.
Course Code: READY-403 Course Title: Mushroom cultivation and Technology	**Outcomes**
CO1	Hands on practice and knowledge about mushroom cultivation and the technology to improve the quality.
Course Code: READY-404 Course Title: Soil, Plant, Water and Seed Testing	**Outcomes**
CO1	Hands on practice and knowledge about different protocols for testing water, seed and Soil of different types.
Course Code: READY-405 Course Title: Commercial Beekeeping	**Outcomes**
CO1	Hands on practice and knowledge about different aspects of Beekeeping
Course Code: READY-406 Course Title: Poultry Production Technology	**Outcomes**
CO1	Hands on practice and knowledge about different aspects Poultry production
Course Code: READY-407	**Outcomes**

Course Title: Commercial Horticulture	
CO1	Hands on practice and knowledge horticultural tools and techniques for different horticultural crops.
Course Code: READY-408 Course Title: Floriculture and Landscaping	**Outcomes**
CO1	Hands on practice and knowledge about different floricultural methods and landscaping architecture.
Course Code: READY-409 Course Title: Food Processing	**Outcomes**
CO1	Hands on practice and knowledge about different methods of food processing, tools and techniques.
Course Code: READY-410 Course Title: Agriculture Waste Management	**Outcomes**
CO1	Hands on practice and knowledge about eradication and utilization of agriculture waste and its management.
Course Code: READY-411 Course Title: Organic Production Technology	**Outcomes**
CO1	Hands on practice and knowledge about different aspects of organic farming
Course Code: READY-412 Course Title: Commercial Sericulture	**Outcomes**
CO1	COI Hands on practice and knowledge about different aspects rearing silk worm and production of silk

B. Tech. Food Technology

B. Tech. Food Technology	
Programme outcomes	This program enables the students to acquire comprehensive knowledge for identification, quantification, and characterization of appropriate food raw materials, processes, and products critical for sustaining life processes and also for industrial applications. They will get the ability to unravel basic principles and methods related to human food nutrition leading to individual and social well-being in a sustainable environment safety and ethics. Students will develop management and communication skills through teamwork and self-learning for healthy and sustainable food systems.
Programme specific outcomes	The student will be able to apply knowledge of food technology and allied disciplines which enable them to understand the emerging techniques and advanced food engineering concepts. Students will get the ability for solving engineering problems related to the modern food industry, food spoilage, and adulteration along with the focus on the importance of food safety and hygiene of nutritious processed foods. By the end of this course, students will be able to work in the domain of food processing, quality assurance, and quality control in private or government organizations and research laboratories to design or process food products as per the needs and specifications, or can also emerge as an entrepreneur.

Course Outcomes

B. Tech. 1st semester	
Courses	**Outcomes**
Professional communication skills (ENG-101)	CO 1: To stimulate intellectual exercises and to develop communicative skills among students. CO 2: To guide them in becoming socially responsible citizens and balanced human beings. CO 3: To train learners in the art of communication through language exercises of both general and technical varieties.
General Microbiology (MIC-101)	CO 1: Illustration of the evolution and scope of microbiology; and history of microbiology.

	CO 2: Introduction to bacteria, fungi, algae, and protozoa, and viruses. CO 3: To understand microbial genetics, bacterial recombination, bacterial conjugation, transduction, and bacterial transformation. CO 4: To learn the different types of mutations, mutagenesis, mutation rate, and repair of mutations.
Basic Mathematics-I (MATH-111)	CO 1: To illustrate the different aspects of mensuration. CO 2: To acquaint with algebra and solution of the quadratic equation. CO 3: To illustrate the different aspects of co-ordinate geometry.
Engineering Drawing and Graphics (EE-101)	CO 1: To know the first and third angle methods of projection, and preparation of working drawing from models. CO 2: To know the different methods of dimensioning and the concept of sectioning. CO 3: To understand the types of rivet heads and riveted joints. CO 4: To understand the different types of lock nuts, studs, machine screws, cap screws, and wood screws
Basics of Electronics Engineering (ETE-101)	CO 1: Introduction to a semiconductor diode, ideal diode, CO 2: Understanding of bipolar junction transistor, construction, transistor operations, and BJT characteristics CO 4: Understanding of small-signal amplifiers and feedback amplifiers.
Workshop Technology (EE-102)	CO 1: Introduction to basic materials such as ferrous and non-ferrous materials and important engineering materials CO 2: To learn the different aspects of measuring and gauging, welding, carpentry, machinery, and sheet metal
Fundamentals of Food Processing (FT-101)	CO 1: Causes and types of food spoilage, scope, and benefit of food preservation and methods of food preservation. CO 2: Preservation by heat treatment, drying, concentration, irradiation, and fermentation. CO 3: Illustration of advanced processing techniques such as pulsed electric field ultrasound, dielectric heating, ohmic and infrared heating, high-pressure processing, microwave processing.
Environmental Sciences & Disaster Management (ENV-101)	CO 1: Introduction to environmental, ecology, and ecosystem. CO 2: Description of renewable and non-renewable resources and forest resources. CO 3: Description of eenvironmental pollution – water, air, land, and noise pollution.

Physical Education (PHE-101)	CO 1: Description of physical training and health; test and measurement in physical education. CO 2: To learn the different aspects of circuit training, interval training, far trek training, pressure training, and resistance training.
B. Tech. 2nd semester	
Food Chemistry of Macronutrients (FC-101)	CO 1: Nature, scope, and development of food chemistry. CO 2: Develop an understanding of dispersed systems of foods, physicochemical aspects of food dispersion system (Sol, gel, foam, emulations). CO 3: Learning of chemistry of carbohydrates, proteins, and lipids. CO 4: Oil processing operations such as refining, hydrogenations, and inter esterification.
Food Microbiology (FT-102)	CO 1: Importance and significance of microbes in food science. CO 2: Learning of Intrinsic and extrinsic factors affecting the growth of microorganisms. CO 3: Sources of contamination in food and their prevention. CO 4: Microbiology of poultry, eggs, and canned foods and food-borne intoxications and infections.
Food Thermodynamics (FT-103)	CO 1: Learning of laws of thermodynamics CO 2: Learning of thermodynamic properties of pure substances in solid, liquid, and vapor phases, and psychometry: CO 3: Description of three stages of water, phase diagram for water, vapor pressure-temperature curve for water. CO 4: Description of properties of steam: wet, dry saturated, superheated steam, use of steam tables.
Fluid Mechanics (EE-103)	CO 1: Learning of flow behavior of viscous foods, compressible and non-compressible fluids and pressure measuring devices. CO 2: Introduction to reciprocating pumps and working of reciprocating pump. CO 3: Description of fluid flow: Classification, steady, uniform and non-uniform, laminar and turbulent, continuity equation. CO 4: Description of dimensional analysis: Buckingham's theorem, application to fluid flow phenomena, Froude number, Reynolds number, Weber number, and hydraulic similitude.

Basics of Electrical Engineering (ETE-102)	CO 1: Learning of Circuit Analysis: Ohm's Law, KCL, KVL Mesh and Nodal Analysis. CO 2: Description of A.C. Circuits, Measuring Instruments, Transformers, AND Three Phase Circuits
Basic Mathematics-II ()	CO 1: Description of trigonometry, elementary calculus, differentiation of simple algebraic trigonometry, theorems on differentiation of the sum. CO 2: Description of Integration of the standard forms as the inverse of differentiation.
Post-Harvest Engineering (FT-104)	CO 1: Learning of post-harvest handling operations; cleaning, separation, drying, shelling, milling. CO 2: Description of materials handling: Introduction to different conveying equipment used for handling of grains, fruits, and vegetables. CO 3: Learning of conveyers, belt conveyor, chain conveyors, screw conveyors, pneumatic conveyers.
Statistics (STAT-102)	CO 1: Definition of statistics and its use and limitations, frequency distribution, and frequency curves. CO 2: Introduction to sampling: random sampling; the concept of standard error; tests of significance- types of errors, the null hypothesis. CO 3: Description of Small sample test for means, student's t-test for a single sample, two samples, and paired t-test. F test; Chi-Square test and Linear regression.
NCC/NSS (PHE-102)	CO 1: Orientation of students towards national problems. CO 3: Study of the philosophy of N.S.S., fundamental rights, directive principles of state policy, the socio-economic structure of Indian society.
B. Tech. 3rd semester	
Crop Production Technology (FT-201)	CO 1: Classification of crops, crop production technology for major cereal crops viz., paddy, wheat, maize, pearl millet, sorghum. CO 2: Description of crop production technology for major pulse crops viz., mango, banana, sapota, amla, pomegranate, guava pigeon pea, cowpea, gram, green gram, black gram. CO 3: Description of crop production technology for major fruits and vegetable crops viz., potato, onion, tomato, chili, and other green and leafy vegetables.
Processing Technology of Liquid Milk (FT-202)	CO 1: Historical development of dairy in India; production and utilization of milk

	CO 2: Learning of production technology for cream, fermented milk products, CO 3: Description of adulterations in milk and its detection CO 4: Description of milk reception equipment, milk tanks/silos, pasteurizers, sterilizers, centrifuges, clarifiers, filtration units, homogenizers, packaging, and filling machines
Processing Technology of Cereals (FT-203)	CO 1: Present status and prospects of cereals and millets. CO 2: Description of paddy processing and rice milling, parboiling, and milling of wheat milling, corn, Barley, oat, sorghum. CO 3: Description of by-products processing of cereals and millets and processing of infant foods from cereals and millets.
Industrial Microbiology (FT-204)	CO 1: History of industrial microbiology; primary and secondary metabolites produced by the microorganisms. CO 2: Description of fermenter, components, and types of the fermenter. CO 3: Description of probiotics, importance, role in fermented foods, organisms involved beneficial effects. CO 4: Description of cell disruption methods: mechanical disruption methods and non-mechanical disruption methods.
Food Chemistry of Micronutrients (FT-205)	CO 1: Learning of Chemistry of food flavor, sensory assessment of flavor, technology for flavor retention. CO 2: Description of Pigments in animal and plants kingdoms, vitamins and minerals. CO 3: Description of chemistry of anti-nutritional factors. Enzymes in the food industry.
Heat and Mass Transfer in Food Processing (FT-206)	CO 1: Description of Basic heat transfer processes, heat transfer coefficients, properties related to heat transfer. CO 2: Description of One-dimensional steady-state heat conduction with heat generation. CO 3: Introduction to unsteady-state heat conduction, system with negligible internal resistance and in various geometries. CO 4: Learning of heat transfer to flowing fluids, application of different types of heat exchangers in dairy and food industry.
Unit Operations in Food Processing-I (FT-207)	CO 1: Size reduction equipment, attrition mills, buhr mill, tumbling mills, tumbling mills, ultra-fine grinders. CO 2: Description of mixers for low- or medium-viscosity liquids, paddle agitators, impeller agitators, powder-liquid contacting devices, other mixers.

	CO 3: Description of mechanical separations, filtration, and membrane separation.
Computer Programming and Data Structures (CSE-221)	CO 1: Review of computer technology; processor, memory, secondary storage, display devices, and other peripheral devices. CO 2: Description of algorithms and flow-charts, role of the compiler and the integrated development environment, and control structures. CO 3: Use of function prototypes, structures, unions, and user-defined types. CO 4: Description of primary data types and user-defined data types, variables, typecasting, operators, building and evaluating expressions.
B. Tech. 4th semester	
Processing Technology of Dairy Products (FT-209)	CO 1: Processing technology of butter, ghee, ice cream, and frozen desserts. CO 2: Description of processing technology of condensed and dried milk, traditional dairy products. CO 3: Description of by-products of the dairy industry and their utilization.
Processing Technology of Legumes and Oilseeds (FT-210)	CO 1: Classification and types of legumes and oilseeds; CO 2: Description of chemical composition, nutritional value, and anti-nutritional compounds in legumes and oilseeds CO 3: Description of nutritional changes during soaking and sprouting of pulses CO 4: Learning of oilseed milling: Ghani's, hydraulic presses, expellers, solvent extraction methods, refining and hydrogenation of oils
Food Biochemistry and Nutrition (FT-211)	CO 1: Learning of biochemistry of carbohydrates, lipids, proteins, vitamins, and minerals. CO 2: Formulation of diets, classification of a balanced diet, preparation of balanced diet for various groups, recommended dietary allowances. CO 3: Description of mechanism of enzyme action, metabolism of lipids, proteins, minerals.
Unit Operations in Food Processing-II (FT-212)	CO 1: Principles of evaporation, mass and energy balance, factors affecting rate of evaporation, thermodynamics of evaporation.

	CO 2: Description of food freezing, freezing point curve for food and water, common food materials. CO 3: Principles of food freezing, freezing time calculation by using Plank's equation. CO 4: Description of expression, extraction, sterilization, and roasting.
Food Biotechnology (FT-213)	CO 1: Chemical nature, properties, and functions of the genetic material. CO 2: Organization of the genetic material in bacteria, eukaryotes, and viruses. CO 3: Description of Transcription and translation, recombinant DNA technology, Ethical issues concerning GM foods. CO 4: Classification of biosensors, application of biosensors, application of biotechnology in food.
Food Refrigeration and Cold Chain (FT-214)	CO 1: Principles of refrigeration, vapor refrigeration, and vapor-absorption refrigeration system. CO 2: Description of cold store, design of cold storage for different categories of food resources. CO 3: Meaning of air-conditioning and factors affecting comfort air-conditioning, classification, sensible heat factor, industrial air-conditioning.
Processing of Spices and Plantation Crops (FT-215)	CO 1: Production and processing scenario of spice, flavor, and plantation crops. CO 2: Description of minor spices: herbs, leaves, and Spartan seasonings and their processing and utilization. CO 3: Learning of post-harvest technology for Tea, coffee, cocoa; Vanilla, and annatto processing. CO 4: Learning of post-harvest technology and processing of areca nut, cashew nut, oil palm
Business Management and Economics (BM-201)	CO 1: Learning of management principles, scientific principles, and administrative principles. CO 2: Description of human resource management, objectives of manpower planning, process, sources of recruitment, the process of selection. CO 3: Learning of finance management: definition, scope, objective; different systems of accounting, Financial accounting, cost accounting, management accounting.
B. Tech. 5th semester	

Processing Technology of Fruits and Vegetables (FT-301)	CO 1: Production and processing scenario of fruits and vegetables in India and the world. CO 2: Description of canning, processing steps, and equipment, quality assurance, and defects in canned products. CO 3: Description of FSSAI specifications and preparation and preservation of juices, squashes, syrups, sherbets, nectars, cordials. CO 4: Learning of commercial processing technology of selected fruits and vegetables for production of various value-added processed products.
Processing of Meat and Poultry Products (FT-302)	CO 1: Sources and importance of meat and poultry; Status of Meat and poultry industry in India. CO 2: Description of preservation of meat by chilling, freezing, pickling, curing, cooking, and smoking. CO 3: Learning of preparation, packaging, and equipment for the manufacture of dehydrated meat products and their quality evaluation CO 4: Description of structure, composition, quality characteristics, processing, preservation of eggs.
Instrumental Techniques in Food Analysis (FT-303)	CO 1: Concepts of food analysis; rules and regulations of food analysis; principles and methodology involved in the analysis of foods. CO 2: Description of chromatography: adsorption, column, partition, gel-filtration, affinity, ion-exchange, size-exclusion method, gas-liquid, high-performance liquid chromatography. CO 3: Learning of Instrumentation and sensors for the food industry, rapid microbiological methods, and chemically sensitive semiconductor devices.
ICT Applications in Food Industry (FT-304)	CO 1: Importance of computerization in the food industry, operating environments, and information systems for various types of food industries. CO 2: Introduction to MATLAB, Basic commands, computing with MATLAB. CO 3: Learning of automation in the Food industry, mechanization, and automation, classification of automation systems. CO 4: Introduction to computational fluid dynamics (CFD), governing equations of fluid dynamics, models of flow.

Food Process Equipment Design (FT-305)	CO 1: Description of marterials for fabrication, mechanical properties, ductility, hardness, corrosion, protective coatings, corrosion prevention linings equipment. CO 2: Description of Design of pressure and storage vessels, agitators and separators, dryers, and extruders.
Food Storage Engineering (FT-306)	CO 1: Importance of scientific storage systems, post-harvest physiology of semi-perishables and perishables, climacteric and non-climacteric fruits. CO 2: Description of traditional storage structures, improved storage structures, modern storage structures. CO 3: Description of aaeration and stored grain management, storage of perishables, functional and structural design of grain storage structures.
Bakery, Confectionery and Snack Products (FT-307)	CO 1: Types, specifications, compositions, ingredients, formulations, processing, equipment for bakery products. CO 2: Types, specifications, compositions, ingredients, formulations, processing, equipment, packaging, storage, and quality testing of confectionery and chocolate products. CO 3: Description of snack foods and breakfast cereals, macaroni products, and malts, types, specifications, compositions, ingredients, formulations, processing.
Marketing Management and International Trade (BM-301)	CO 1: Concept, functions, scope, and marketing management Market measurement, market forecasting, market segmentation, targeting, and positioning. CO 2: Learning of aadvertising, objectives, budget, and advertising message, media planning, personal selling, and publicity. CO 3: Description of direct exports, indirect exports, licensing, joint ventures, direct investment, and internationalization process, distribution channels.
B. Tech. 6th semester	
Processing Technology of Beverages (FT-308)	CO 1: History and importance of beverages and status of the beverage industry CO 2: Description of Low-calorie and dry beverages, isotonic and sports drinks, dairy-based beverages CO 3: Description of FSSAI specifications for beverages, Sweeteners, colorants, acidulates, clouding and clarifying and flavoring agents for beverages.

Food Plant Sanitation (FT-309)	CO 1: Good manufacturing practices, current good manufacturing practices; standard operating procedures, good laboratory practices, sanitation. CO 2: Learning of personal hygiene and sanitary food handling and pest control. CO 3: Learning of dairy processing plant sanitation, seafood plant sanitation, and beverage plant sanitation.
Food Packaging Technology and Equipment (FT-310)	CO 1: Need of packaging, package requirements, and package functions. CO 2: Description of package materials and their classification. CO 3: Description of lamination, molding-injection, blow, extrusion, and coating on paper and films. CO 4: Learning of permeability of gases and vapors; Permeability of multilayer materials; Permeability in relation to packaging requirement of foods.
Processing of Fish and Marine Products (FT-311)	CO 1: Types of fish and other marine products, classification of fish (fresh water and marine). CO 2: Principles of canning, the effect of heat processing on fish, storage of canned fish. CO 3: Description of fish protein concentrates (FPC), fish protein extracts (FPE). CO 4: Description of oxygen absorbents and CO2 generators, ethanol vapor generation, hurdle barrier concept.
Sensory Evaluation of Food Products (FT-312)	CO 1: Introduction, definition, and importance of sensory evaluation in relation to consumer acceptability and economic aspects. CO 2: Learning of basic principles, senses and sensory perception, physiology of sensory organs, classification of tastes and odors. CO 3: Description of panel selection, screening, and training of judges, requirements of sensory evaluation. CO 4: Learning of Interrelationship between sensory properties of food products and various instrumental and physicochemical tests.
Food Additives and Preservatives (FT-313)	CO 1: Intentional and unintentional food additives, their toxicology and safety evaluation. CO 2: Regulatory aspects of dyes, food color (natural and artificial), pigments, and their importance.

	CO 3: Description of Humectants/polyhydric alcohol, anticaking agent, firming agent, flour bleaching and maturing agents, antioxidants, nutritional and non-nutritional sweeteners.
Food Quality, Safety Standards, and Certification (FT-314)	CO 1: Food quality its definition and its role in the food industry. CO 2: Description of pathological and entomological defects. CO 2: Description of laboratory quality measurement, consumer measurement, and limitations of the consumer survey.
Instrumentation and Process Control in Food Industry (FT-315)	CO 1: Learning of the static and dynamic characteristics, temperature and temperature scales, various types of thermometers, thermocouples, resistance thermometers, and pyrometers. CO 2: Learning of kinds of flow, rate of flow, total flow differential pressure meters, variable area meters, food flow metering. CO 3: Description of transmission, transducer, computer-based monitoring, and control.
Project Preparation and Management (BM-302)	CO 1: Functions and viewpoints of management, the evolution of project management, forms and environment of project management. CO 1: Learning of project identification and screening, project appraisal, project charter and project proposal. CO 1: Description of project planning and scheduling, project cost estimation, project implementation, monitoring and control, and project completion and future directions.
B. Tech. 7th semester	
Communication Skills and Personality Development (ENL-401)	CO 1: Description of structural and functional grammar. CO 2: Description of communication, verbal and nonverbal communication. CO 3: Learning of Oral presentation skills, public speaking; group discussion sentence patterns in English.
Entrepreneurship Development (BM-403)	CO 1: Importance and growth, characteristics and qualities of an entrepreneur, the role of entrepreneurship. CO 1: Concept of entrepreneurship, entrepreneurial and managerial characteristics, managing an enterprise. CO 1: Learning of corporate entrepreneurship; role, mobility of entrepreneur; entrepreneurial motivation.

	CO 1: Description of Government schemes and incentives for promotion of entrepreneurship.
Student READY - Experiential Learning Program - I (EXPL-401)	CO 1: Experiential Learning is intended to build practical skills and entrepreneurship attributes among the students to deal with work situations and for better employability and self-employment. CO 2: To develop the detailed Project Report on setting up of an enterprise in the selected areas of product manufacture and evaluation of the module.
Student READY - Research Project (RP-401)	CO 1: To investigate selected problems of special interests in Food Processing Technology to the individual student. CO 2: The work includes library work, field or laboratory research, recording data, analyzing data and writing of report.
Student READY - Seminar 1 (FT-500)	CO 1: To develop presentation skills among students CO 1: Presentation and discussion by each student on current topics/interests in Food Processing Technology
B. Tech. 8th semester	
Student READY - Industrial Tour (INDT-401)	CO 1: Educational tour of two three weeks to various industries within and outside the state of the university CO 2: To develop Writing skills among students and submission reports on Industrial tour.
Student READY - Internship/In-Plant Training (INDT-402)	CO 1: In-plant Training is intended to expose the students to an environment in which they are expected to be associated in their future careers. CO 2: The students will gain hands-on experience in one or more commercial establishments.

Course Outcomes of Biotechnology

SEMESTER I

Subject Code: BT-501

Course Title: Cell and Molecular Biology

Evolution of cell and biological macromolecules, general features of

CO 1. Give introduction to prokaryotic and eukaryotic cells

CO 2. Describe structure and function of plasma membrane, molecular organization of cytoskeleton and functions of different cell organelles.

CO 3. Explain Chromosome organization, chromatin structure, complexity of eukaryotic chromosome, cot curve.

CO 4. Explain cell division and cell cycle

CO 5. Describe DNA replication in prokaryote and eukaryotes.

CO 6. Describe transcription process in prokaryote and eukaryotes

CO 7. Give a detailed account of translation process of prokaryote and eukaryotes.

Subject Code: MICRO-511

Course Title: General Microbiology

CO 1. Write down history and scope of microbiology

CO 2. Explain characterization, classification and identification of microorganisms, microscopic examination of microorganisms.

CO 3. Describe fine structure and morphology of bacteria, reproduction and cultivation, mixed and pure culture.

CO 4. Explain Microbial physiology and bacterial genetics.

CO 5. Describe viruses, bacteriophages and control of microorganisms (physical and chemical agents

CO 6. Explain biological fixation of nitrogen.

CO 7. Explain the different, resistance and defense mechanisms in host pathogen interactions.

Subject Code: BIOCHEM-511

Course Title: General Biochemistry

CO 1. Give fundamental principles that governs life.

CO 2. Explain structure and function of biomolecules.

CO 3. Explain enzyme classification and enzyme kinetics in detail.

CO 4. Give a detailed account for photosynthesis and photorespiration.

CO 5. Explain glucose metabolism in plants.

CO 6. Describe Lipid metabolism.

CO 7. Write down the nutritional aspects of carbohydrates, lipids, proteins and minerals, hormones.

Subject Code: BT-504

Course Title: General Genetics

CO 1. Give chromosome structure and organization, gene structure in detail.

CO 2. Explain concepts of inheritance, Mendelian principles of genetics, applications of Mendelian principles.

CO 3. What are chromosomal basis of inheritance and linkage?

CO 4. Describe replication of genetic material and central dogma.

CO 5. What are numerical and structural chromosomal changes?

CO 6. What do you understand by population and evolutionary genetics.

CO 7. Explain different types of genetic disorders and genetic counseling.

Subject Code: BT-505

Course Title: Computational Biology & Biostatistics

CO 1. Explain the concepts of variables in biological systems, collection, classification, tabulation, graphical and diagrammatic representation of numerical data.

CO 2. Explain the measure of central tendency, measure of dispersion, correlation and regression.

CO 3. Explain test of significance based on Z, $\chi 2$, t and F statistics, correlation.

CO 4. Describe Laboratory Information management systems (LIMS).

CO 5. Describe different different protein data bases and hteir functions.

CO 6. Give details regarding sequence analysis using bioinformatics toosl.

CO 7. Explain gene finding algorithms and models.

CO 8. Describe Protein-Protein interactions and microarrays chips and data analysis.

Subject Code: BT-506

Course Title: Techniques in Biotechnology-I

CO 1. Perform experiments for the detection of carbohydrates, amino acids, and proteins.

CO 2. Perform SDS-PAGE for protein separation

CO 3. Perform the isolation of bacteria from different sources (soil, water and air)

CO 4. Identify the isolated bacterial colonies using microscopic and staining techniques, plotting growth curve from isolated bacterial strain.

CO 5. Prepare slides and observe different stages for Mitosis and meiosis.

CO 6. Explain the inheritance and linkage analysis

CO 7. Solve the given numerical of ANOVA and chi square test.

SEMESTER II

Subject Code: BT-507

Course Title: Plant and Animal Biotechnology

CO 1. Write down about historical perspectives of plant biotechnolgoy.

CO 2. Explain various methods of *in vitro* propagation in plants.

CO 3. Describe Protoplast isolation, culture and applications of somatic hybridization.

CO 4. Describe the significance of plant cell suspension culture in p production of secondary metabolites.

CO 5. Describe various methods if gene transfer.

CO 6. Give a detailed account of various molecular markers used in crop improvement.

CO 7. Give different types of culture media and cell cultures.

CO 8. Explain *in vitro* fertilization and embryo transfer technique in detail.

Course No. BT 508

Course Title: Cell Communication and Cell Signaling

CO 1. What do understand by Host parasitic relationship?

CO 2. What are different Polar/Non Polar Signaling molecules?

CO 3. Enumerate the role of different kind of receptors present on Cells.

CO 4. Explain the different Cell –Cell, Cell Matrix and Cell Basal Lamella interactions.

CO 5. Give a detailed account of Cancer, Types of Cancer, Tumour suppressor Genes and Oncogenes

CO 6. Explain Apoptosis, Necrosis and Cell Cycle and relate them with Cancer.

Subject Code: BT-509

Course Title: Instrumental methods of Analysis

CO 1. Explain different types of microscopy.

CO 2. Describe different aspects of radioisotopy and its applications.

CO 3. Explain different types of chromatography and its applications.

CO 4. What is electrophoresis and expalin the principle and functioning of 2D PAGE.

CO 5. Explain different methods of DNA sequencing.

CO 6. What is Spectroscopy and expalin different types of spectroscopy.

Subject Code: BT-510

Course Title: Immunology

CO 1. Describe different types of immunity and cells associated with immune system.

CO 2. Explain different aspects of antibody, structure and functions.

CO 3. Write down the role of different MHC in immune system and

CO 4. Describe different types of Hypersensitivity reactions and regulation of IgE, mast cells, basophils and allergy.

CO 5. Describe the complement system- and its different pathways.

CO 6. Describe hybridoma technology and production of monoclonal antibody production.

CO 7. Describe different immunological techniques to stduy antigen antibody reactions.

CO 8. Explain different autoimmune disorders.

Subject Code: BT-511

Course Title: Bioprocess Engineering and Technology

CO 1. Describe isolation, preservation and maintenance of industrial microorganisms and their kinetics.

CO 2. Write down about analysis of batch, fed-batch and continuous bioreactions, stability of microbial reactors, analysis of mixed microbial populations.

CO 3. Describe neural networks, mathematical modeling, role of computers in bioprocess control and applications.

CO 4. What is whole cell immobilization and their industrial applications.

CO 5. Give detailed account of industrial production of ethanol, citric and acetic, glycerol, butanol and penicillin.

CO 6. amino acids (lysine, glutamic acid), vitamins and single cell proteins- algal, fungal and yeast biomass.

CO 7. Describe the applications of microorganisms in mineral and oil recovery

Subject Code: BT-512

Course Title: Techniques in Biotechnology-II

CO 1. Perform the isolation of genomic and plasmid DNA

CO 2. Perform quantification of DNA through agarose gel electrophoresis techniques and spectrophotometer based DNA quantification

CO 3. Perform PCR and molecular marker analysis

CO 4. Perform Restriction enzyme digestion

CO 5. Selection of recombinants using blue/white colony selection.

CO 6. Perform cell and explant culture, subculturing and regeneration, Embryo rescue, Anther culture

Genetic transformation through particle bombardment, GUS assay.

CO 7. Perform Immunoelectrophoresis;,Enzyme immunoassays including ELISA.

CO 8. Isolate industrially important microorganisms for microbial processes.

CO 9. estimate production and estimation of alkaline protease.

SEMESTER III

Subject Code: BT-513

Course Title: Genetic Engineering

CO 1. Define artificial chromosomes. Draw a well labeled diagram of YAC and explain its functioning.
CO 2. Explain the extraction of RNA from plants using a flow chart.
CO 3. What is protein-protein interaction? Explain its different methods.
CO 4. Explain heterologous expression in *E.coli and* Yeast.
CO 5. Distinguish between genomic DNA and cDNA library.
CO 6. Explain different methods of next generation sequencing with the help of suitable diagrams.
CO 7. Give an introduction to various components and steps of PCR.
CO 8. How would you check success of a PCR reaction and in case of undesired results what

kind of changes in reaction and process conditions should be tried for further reactions?
CO 9. Give various examples of genetic manipulation in animals and plants. Explain the risk and safety aspects associated with genetic engineering.

Subject Code: BT-514
Course Title: Enzymes and Enzyme Technology
CO 1. Explain nomenclature and classification of enzymes
CO 2. Describe various aspects of enzymology.
CO 3. Describe enzyme extraction, purification, assay and analysis of enzymes
CO4. Describe enzyme kinetics in detail.
CO 5. Explain mechanism of enzyme catalysis.
CO 6. What is cooperativity and its role in enzymology.
CO 7. Give a detailed account regarding clinical aspects of enzymes.

Subject Code: BT-515
Course Title: Biosafety, Bioethics & IPR
CO1. Expalin the role of biosafety in human health and environment.
CO 2. Describe biosafety and risk assessment issues, biosafety guidelines and regulatory framework,
CO 3. What is National biosafety policies and law, The Cartagena Protocol on biosafety, WTO and other international agreements related to biosafety, risk management issues- containment.
CO 4. What are general principles for the laboratory and environmental biosafety.
CO 5. Explain regulatory affairs for drugs and biologicals.
CO 6. what are the different effects of GMOs on biodiversity and human health.
CO 7. What are the different aspects of IPR.

Subject Code: BT-516
Course Title: Techniques in Biotechnology-III
CO 1. Perform isolation of plasmid DNA.
CO 2. Perform restriction digestion of plasmid DNA and electrophoresis.
CO 3. Perform ethidium bromide staining and gel documentation.
CO 4. Perform cloning DNA in a pBlueScript vector.
CO 5. Perform Polymerase chain reaction and resolution of amplicons Sequencing methods.
CO 6. Study the effect of pH and temperature on enzyme activity and stability Enzyme kinetics analysis.

Optional Subject Code: BT-518
Course Title: Food Biotechnology
CO 1. explain the microbial spoilage of different food types and agents responsible for the spoilage.milk, meat, plant products.
CO 2. Describe different fermented and microbial foods in detail.
CO 3. Describe various techniques for microbiological examination of foods.
CO 4.. What are different food preservation techniques.
CO 5. What are the different measures taken for quality control of food products.

CO 6. Describe different myths and facts associated with food biotechnology,
CO 7. Explain about recombinant DNA technology derived food benefits and safety guidelines.

Optional Subject Code: BT-519
Course Title: Plant Molecular Breeding
CO 1. Write down the methods of breeding in P self and cross- pollinated crops.
CO 2. Give a detailed account for sequence based markers.
CO 3. what are the advanced methods of genotyping?
CO 4. What is QTL mapping? Describe AB-QTL analysis and fine mapping of gene/QTL.
CO 5. Describe the complete mechanism and principle associated with TILLING and Eco-TILLING
CO 6. What are the different aspects of marker assisted selection.

Optional Subject Code: BT-523
Course Title: Environmental Biotechnology
CO 1. Explain the different types of pollutions and their impact on environment.
CO 2. Describe waste water management and different treatment system associated with it.
CO 3. Describe solid waste management and different treatment schemes associated with it.
CO 4. Explain various bioremediation and phytoremediation strategies for biodiversity and its conservation.
CO 5. What are different renewable and non-renewable resources of energy.
CO 6. What is environmental protection act and different environmental laws and policies.

Optional Subject Code: BT-524
Course Title: Microbial Biotechnology
CO 1. Explain isolation and preservation of industrially important microorganisms.
CO 2. Describe different aspects of genomics and transcriptomics of microorgansims.
CO 3. Explain metagenomics and systems biology study in micororganisms.
CO 4. Describe production of proteins and enzymes in different microorganisms.
CO 5. Explain the role of microorganisms as biocontrol agent.
CO 6. Describe biological nitrogen fixation.
CO 7. What are applications of microbes in environmental biotechnology.

Subject Code: BT-600
Dissertation
CO1 Writing synopsis and objectives for proposed research work.
CO2 Study of Literature, generation of data.
CO3 Presenting the data and outcomes at different platforms.
CO4 Writing thesis/report.
CO5 Writing research articles and conference presentations. '

Subject Code: BT-701
Dissertation
CO1 Writing synopsis and objectives for proposed research work.
CO2 Comprehensive examination and Viva Voce
CO3 Study of Literature, generation of data.

CO4 Presenting the data and outcomes at different platforms.
CO5 Writing thesis/report.
CO6 Writing research articles and conference presentations. '

2.6.1 Program Outcomes (M.Sc. and Ph.D. Biotechnology):

P01: Trained Manpower: The post graduate in biotechnology is trained in array of biotechnological tools and techniques including molecular biology and genetic engineering for their intended applications.

P02: Plant tissue culture based germplasm conservation: The micropropagation techniques can be used for germplasm conservation, rapid multiplication of plants, production of secondary metabolites, making synthetic seeds etc.

P03: Quality control:Knowledge of microbiological criterias through food biotechnology and microbiological techniques along with biosafety principles are useful in development of skills for quality control in biotechnology/pharmaceutical industry.

P04: Research aptitude: The specific training through intensive research work for six months during masters' dissertation (and 3 years for doctoral dissertation) and a continuous research exposure in state of art research laboratories is boon for understanding key research activities and developing a positive attitude towards research. The research methodology course is considered as a value addition to it.

P05: Designing experiments and troubleshooting: The research training based on specific objectives includes designing and performing experiments leading to data generation. The problems encountered during experimentation needs to resolved thus generating troubleshooting skills.

P06: Team work: Ability to work in matrix environment (both PG and Ph.D. Students) not only increases the knowledge but also leads to the development of team spirit among researchers.

P07: Knowledge and use of advanced techniques: With major emphasis on tools and techniques this course provides an in depth understanding about their principles and application. Further, the hands on training on these techniques generate confidence and develop skills for employability.

P08: Data analysis and Literature survey: As an integral part of curricula the literature survey for proposed research work and given assignments followed by analysis of generated research data provides a good and useful training as a life long learning experience for its utilization.

2.6.1 Program specific outcomes:

PSO1 Understanding the molecular biology concepts and their application in various biotechnological investigations.

PSO2 Knowledge of bio-molecules and their utility in biological systems.

PSO3 In depth knowledge of genetics and molecular breeding for its application in crop improvement and other biotechnological interventions.

PSO4 To understand and apply genetic engineering tools and techniques for sustainable development.

PSO5 To gain the knowledge regarding biosafety guidelines, ethical issues and intellectual property in biotechnology industries.

PSO6 To develop skill for analyzing the data and sequence outcomes of the biotechnological research using modern bioinformatics and statistical tools.

PSO7 Utilization of microbes for beneficial applications.

PSO8 understanding about enzymes, their characteristics features and applications in biotechnology.

2.6.2 Attainment of PO, PSO and CO:

The methods for measurement of the PO.PSO and CO are as follows:

1. Conducting and evaluating first and second sessional examinations
2. Giving assignments based on specific COs or POs followed by presentation and

evaluation.

3. Designing a research problem and writing a synopsis for proposed work for approval by research committee.

4. Presentations through class seminars and credit seminar.

5. Internal assessment based on daily performance in practical classes

6. Pre- thesis seminar for presenting the research outcome during dissertation.

7. Writing a thesis and its external evaluation by expert in the subject (for PG and Ph.D. Students).

8. For Doctoral students comprehensive examination followed by Viva-Voce by an external examiner is mandatory during the research period.

PROGRAM OUTCOMES, PROGRAM SPECIFIC OUTCOMES, COURSE OUTCOMES

M.Sc. Agronomy

Program Outcomes	In this program students learn about different kinds of crop production practices, their management as well as their interaction with allied sectors of agriculture. Student can work in Government Sector specially in Agriculture Department and different private sectors *viz*, pesticide companies, fertilizer companies, seed also in seed production sectors.
Program Specific Outcomes	Students learn about different cropping (oil seeds, fibers, legumes, cereals etc.) as well as farming system (IFS, organic farming, conservation farming etc.) and their modern concepts and principles.
Course	**Outcomes**
Crop production	It provides modern concept of crop production with specialization of cereals, pulses, oilseeds, tubers, medicinal, aromatic and under-utilized crops.
Soil management	In this program student learn about soil mineralogy, genesis, classification, survey as well as management of problematic soils. It also deals with soil fertility and nutrient management practices.
Organic farming	It provides a wide knowledge about different kind of organic manures and their efficient utilization in various cropping systems.
Weed management	It enables the students to attain knowledge on basic principles and modern practices of weed management.
Water management	To tech the students about principles of water management of the crops and cropping systems, practices to enhance the water use efficiency.

COURSE OUTCOMES

Course	Course Outcomes
M.Sc. Agronomy 1st Semester	
AGRON-501	Student learn about modern concept concepts, scientific principles of crop production, quantitative agro-biological principles and modern concept of tillage.
AGRON-503	Understand the weed biology and ecology, herbicide classification, mode and mechanism of action of herbicides and integrated weed management in different crops.
AGRON-513	Enhance the student skill for organic farming, socio-economic impact, export potential of organic farming, control of weeds, diseases and other pest in organic farming.
M.Sc. Agronomy 2nd Semester	
AGRON-502	Familiarize with preparation and use of organic manures and biofertilizers, commercial fertilizers, time and methods of manures and fertilizer application in respect to soil fertility and productivity.
AGRON-508	Ability to understand the importance of medicinal and aromatic plants in human health, classification of these plants and climate, soil requirements, cultural practices, yield and important constituents of medicinal and aromatic plants.
M.Sc. Agronomy 3rd Semester	
AGRON-504	Develop an understanding of water and its role in plants, water resources and major irrigation project of India and water management in different crops and cropping system.
AGRON-506	Student learn about origin, history, area, production, classification, varieties, climate, soil, water and cultural requirement of rabi and kharif season crops.

PROGRAM OUTCOMES, PROGRAM SPECIFIC OUTCOMES, COURSE OUTCOMES

Ph.D. Agronomy

Program Outcomes	In this program students learn about different modern trends in agronomy, crop ecology, crop production and system modeling, crop growth and productivity, irrigation management, soil conservation and watershed management, interested farming systems for sustainable agriculture and advance techniques of weed management.
Program Specific Outcomes	Students learn about modern techniques of weed, watershed and irrigation management with special reference to advance trends in agronomy and crop ecology.
Course	**Outcomes**
Crop growth and productivity	Learning of globalization of agriculture and WTO, different methods of farming, GIS, GPS, and remote sensing, GM crops and global warming, elementary model for growth and elementary model for crop growth, concept of crop ecology, ecosystem types and function.
Irrigation management	Develop an understanding of water resources of India, irrigation projects, soil plant water relationship and land suitability for irrigation.
Weed management	It enables the students to attain knowledge about physiological and biological aspects of herbicides and their mode of action and advancement in herbicide application methods.

COURSE OUTCOMES

Course	Course Outcomes
Ph. D. Agronomy 1st Semester	
AGRON-601	Understand the crop residue management in multiple cropping system, latest development in in plant management, export potential of organic products, sustainable agriculture and research methodology in Agronomy.
AGRON-602	Enhance the student skill for physiological response of crop plants, succession and climax concept, principles of plant distribution and adaption, crop and world food supply and exploitation of solar energy in crops.
AGRON-603	Student learn about system classification, modeling techniques and method of irrigation, elementary models for crop growth, dry mater production and distribution in different crops.
Ph.D. Agronomy 2nd Semester	
AGRON-604	Familiarize with plant density and crop production, physiological limitation for crop yield, growth analysis (CGR, RGR, NAR, LAI, LAD, LAR) growth curve, principles involved in inter and mixed cropping, competitive relationship and competition functions and concept of plant ideotype.
AGRON-605	Ability to understand the water resources of India, irrigation projects, soil plant water relationship, water movement in soil, application of irrigation water and land suitability for irrigation.
AGRON-606	Understand the crop weed competition in different cropping systems, physiological and biological aspects of herbicide, development of transgenic herbicide resistant crops and relationship of herbicide with different interculture operations.

PROGRAM OUTCOMES, PROGRAM SPECIFIC OUTCOMES, COURSE OUTCOMES
M.Sc. Ag. Entomology

Programme outcome	Entomologists commonly work with Plant Breeders, Farmers, Agronomists, Horticulturists, Pathologists etc. in the fields, farms and gardens wherever plants grow. Additionally, Entomologists engage with biological scientists and engineers to create safer living arrangements and achieve high yield and potential boost to the Indian agriculture economy.
Programme specific outcome	Expertise in the identification, life history and ecology of insect pests and predators/ parasites as well as the basic principles and strategies of their management. Aspirants of Entomology, comprises with the basic knowledge and technologies used in Apiculture, Nematology, Sericulture, Biological control Toxicology, Economic Entomology etc. Interdisciplinary research work is also being carried out, with the different departments like Plant Pathology, Biochemistry, Molecular biology, Soil science, Horticulture, Agronomy etc. The knowledge acquired and skill developed in the field of entomology, help in recognizing the applications of latest technologies in all spheres of agriculture and develop crops with improved productivity thereby increasing farmers' income, better human health and decreased environmental pollution as well as meet out the future challenges in agricultural crops and storage grains.
Course	**Course Outcomes (COs)**
M.Sc. Ag. Entomology 1st Sem.	
Major	
Insect Morphology (ENT 501)	CO 1: Concepts of insect morphology their principles, utility and relevance CO2: Description of head- origin, **s**tructure and modification; types of mouthparts and antennae. CO3: Description of Thorax- Areas and sutures. Wings: structure and modifications, wing coupling apparatus and mechanism of flight. Legs: structure and modifications. CO 4: Description of abdomen- Segmentation and appendages; Genitalia and their modifications; Embryonic and post-embryonic development; Types of metamorphosis. Insect sense organs.
Insect Anatomy, Physiology and Nutrition (ENT 502)	CO 1: Understand the scope and importance of insect anatomy and physiology. CO 2: Described structure, modification and physiology of different systems. CO 3: The concept of thermodynamics; physiology of integument, moulting; growth, metamorphosis and diapause. CO4: Insect nutrition- role of vitamins, proteins, amino acids, carbohydrates, lipids, minerals and other food constituents. CO 5: Extra and intra-cellular microorganisms and their role in physiology; artificial diets.

Classification of Insects (ENT 504)	CO 1: Describes brief evolutionary history of Insects- introduction to phylogeny of insects and Major Classification of Superclass Hexapoda CO 2: Identification of classes by distinguishing characters, general biology. CO 3: Described habits, habitats and distinguishing characteristics of insect falling in different orders and economically important families contained in them.
Biological Control of Crop Pests and Weeds (ENT 507)	CO 1: Describes history, principles and scope of biological control; important groups of parasitoids, predators and pathogens. CO 2: Biology, adaptation, host seeking behaviour of predatory and parasitic groups of insects. CO 3: Role of insect pathogenic nematodes, viruses, bacteria, fungi, protozoa etc., their mode of action. CO 4: Biological control of weeds using insects. CO 5: Mass production of quality biocontrol agents- techniques, formulations, economics, field release/application and evaluation.
Minors	
Principles of Plant Pathology (PL PATH 504)	CO 1: Describe in detail definitions, concept, history of plant disease. Provide basic understanding about biotic and abiotic factors and causes of plant disease CO 2: Develop an understanding about growth, reproduction and role of environment in plant diseases CO 3: Enumerate and explain recognition concept and infection, symptomatology, disease development- role of enzymes, toxins, growth regulators; defense strategies- oxidative burst; Phenolics, Phytoalexins, PR proteins, Elicitors. Altered plant metabolism as affected by plant pathogens CO4: Develop an understanding about genetics of resistance; 'R' genes; mechanism of genetic variation in pathogens; molecular basis for resistance; marker-assisted selection; genetic engineering for disease resistance. CO 5**:** Explain in detail different plant management strategies
Compulsory Non-Creditable Courses	
Library and Information Services (PGS 501)	CO 1: Explains introduction to library and its services; Role of libraries in education, research and technology transfer. CO 2: Classification systems and organization of library; Sources of information- Primary Sources, Secondary Sources and Tertiary Sources; Intricacies of abstracting and indexing services (Science Citation Index, Biological Abstracts, Chemical Abstracts, CABI Abstracts, etc.); Tracing information from reference sources; Literature survey; Citation techniques/Preparation of bibliography. CO 3: Use of CD-ROM Databases, Online Public Access Catalogue and other computerized library services; Use of Internet including search engines and its resources; e-resources access methods.
Technical Writing and Communication Skills	CO 1: Various forms of scientific writings- theses, technical papers, reviews, manuals, etc; Various parts of thesis and research

(PGS 502)	communications (title page, authorship contents page, preface, introduction, review of literature, material and methods, experimental results and discussion). CO 2: Grammar (Tenses, parts of speech, clauses, punctuation marks); Error analysis (Common errors); Concord; Collocation; Phonetic symbols and transcription. CO 3: Accentual pattern: Weak forms in connected speech: Participation in group discussion: Facing an interview; presentation of scientific papers.
M.Sc. Ag. Entomology, 2nd Sem.	
Major	
Insect Ecology **(ENT 505)**	CO 1: Concepts of insect morphology their principles, utility and relevance CO2: Description of head- origin, **s**tructure and modification; types of mouthparts and antennae. CO3: Description of Thorax- Areas and sutures. Wings: structure and modifications, wing coupling apparatus and mechanism of flight. Legs: structure and modifications. CO4: Description of abdomen- Segmentation and appendages; Genitalia and their modifications; Embryonic and post-embryonic development; Types of metamorphosis. Insect sense organs.
Toxicology of Insecticides (ENT 508)	CO 1: Describe the definition and scope of insecticide toxicology; history of chemical control; pesticide use and pesticide industry in India. CO 2: Classification of insecticides and acaricides based on mode of entry, mode of action and chemical nature. Structure and mode of action of insect growth regulators, microbials, botanicals, new promising compounds, etc. CO 3: Describes principles of toxicology; evaluation of insecticide toxicity; joint action of insecticides- synergism, potentiation and antagonism; factors affecting toxicity of insecticides; insecticide compatibility, selectivity and phytotoxicity. CO 4: Insecticide metabolism; pest resistance to insecticides; mechanisms and types of resistance; insecticide resistance management and pest resurgence. CO5: Insecticide residues, their significance and environmental implications. CO 6: Insecticide Act, registration and quality control of insecticides; safe use of insecticides; diagnosis and treatment of insecticide poisoning.
Pests of Horticultural and Plantation Crops (ENT 512)	CO 1: Description of fruit Crops- mango, guava, banana, jack, papaya, pomegranate, litchi, grapes, ber, fig, citrus, aonla, pineapple, apple, peach and other temperate fruits. CO 2: Description of vegetable crops- tomato, potato, radish, carrot, beetroot, cole crops, French beans, chow-chow, brinjal, okra, all gourds, gherkin, drumstick, leafy vegetables etc. CO 3: Description of plantation crop- coffee, tea, rubber, coconut, arecanut, cashew, cocoa etc.; Spices and Condiments- pepper, cardamom, clove, nutmeg, chillies, turmeric, ginger, beetlevine etc. CO 4: Description of ornamental, medicinal and aromatic plants and pests

	in polyhouses/protected cultivation.
Minor	
Principles of Plant Disease Management (PL PATH 506)	**CO 1:** Explain the principles of plant disease management by cultural, physical, biological, chemical, organic amendments and botanicals methods of plant disease control, integrated control measures of plant diseases. **CO 2:** Describe the disease resistance and molecular approach for disease management. **CO 3:** Describe the foliage, seed and soil application of chemicals, role of stickers, spreaders and other adjuvants, health vis-a-vis environmental hazards, residual effects and safety measures **CO 4:** Understanding of history of fungicides, bactericides, antibiotics, concepts of pathogen, immobilization, chemical protection and chemotherapy, nature, properties and mode of action of antifungal, antibacterial and antiviral chemicals
Supporting course	
Experimental Designs (STAT 512)	CO 1: understand various uniformity trials, size and shape of plots and blocks; Analysis of variance; Completely randomized design, randomized block design and Latin square design. Split plot and strip plot designs; Analysis of covariance and missing plot techniques in randomized block and Latin square designs. CO 2: Transformations, crossover designs, balanced incomplete block design, resolvable designs and their applications CO 3: Lattice design, alpha design - concepts, randomisation procedure, analysis and interpretation of results. CO 4: Response surfaces. Experiments with mixtures.
Compulsory Non-Creditable Courses	
Intellectual Property and Its Management in Agriculture (PGS 503)	CO 1: Understand historical perspectives and need for the introduction of Intellectual Property Right regime; CO 2: Describes the TRIPs and various provisions in TRIPS Agreement; CO 3: Intellectual Property and Intellectual Property Rights (IPR), benefits of securing IPRs; Indian Legislations for the protection of various types of Intellectual Properties; Treaty on Plant Genetic Resources for Food and Agriculture. CO 4: Licensing of technologies, Material transfer agreements, Research collaboration Agreement, License Agreement.
Basic Concepts in Laboratory Techniques (PGS 504)	CO 1: Describes about safety measures while in Lab; Handling of **chemical** substances; Use of burettes, pipettes, measuring cylinders, flasks, separatory funnel, condensers, micropipettes and vaccupets; washing, drying and sterilization of glassware; Drying of solvents/ chemicals. CO 2: Weighing and preparation of solutions of different strengths and their dilution; Handling techniques of solutions; Preparation of different agrochemical doses in field and pot applications; Preparation of solutions of acids; Neutralization of acid and bases; Preparation of buffers of different strengths and pH values. CO 3: Use and handling of microscope, laminar flow, vacuum pumps, viscometer.

M.Sc. Ag. Entomology, 3rd Sem.	
Major	
Principles of Integrated Pest Management (ENT 510)	CO 1: The concept and philosophy, ecological principles, economic threshold etc are understood for consideration of economic management strategy. CO2: Describe political, social and legal implications of IPM; pest risk analysis; pesticide risk analysis; cost-benefit ratios and partial budgeting; case studies of successful IPM programmes. CO3: Explained about the tools of pest management and their integration- legislative, cultural, physical and mechanical methods; pest survey and surveillance, forecasting, types of surveys including remote sensing methods, factors affecting surveys.
Techniques in Plant Protection (ENT 518)	CO 1: Pest control equipments, principles, operation, maintenance, selection. CO2: Methods of pesticides and biocontrol agent's application: seed dressing, soaking, root-dip treatment, dusting, spraying, application through irrigation water. CO 3: Protein isolation from the pest and host plant and its quantification using spectrophotometer and molecular weight determination using SDS/ PAGE. CO 4: Use of computer application for predicting/ forecasting pest attack and identification.
Minor	
Integrated Disease Management (PL PATH-516)	CO 1: Describe the introduction, definition, concept and tools of disease management, components of integrated disease management- their limitations and implications. CO 2: Understanding the development of IDM- basic principles, biological, chemical and cultural disease management. CO 3: Understanding the IDM in important crops- rice, wheat, cotton, sugarcane, chickpea, rapeseed- mustard, pearl millet, *kharif* pulses, vegetable crops and fruit crops.
Supporting course	
Remote Sensing and Geographical Information System (SPG 503)	CO 1: Describes the use of aerial photography, satellite imagery and geographic information system for the collection, storage and spatial analysis for geo-reference. Co 2: Future prospects of remote sensing in India, software used in remote sensing, GIS versus remote sensing, Introduction to GIS software.
Compulsory Non-Creditable Courses	
Agriculture Research Ethics and Rural Development Programmes (PGS 505)	CO 1: understand history of agriculture in brief; Global agricultural research system: need, scope, opportunities. CO 2: Role in promoting food security, reducing poverty and protecting the environment; National Agricultural Research Systems (NARS) and Regional Agricultural Research Institutions; Consultative Group on International Agricultural Research (CGIAR): International Agricultural Research Centers (IARC), partnership with NARS, role as a partner in the global agricultural research system, strengthens the capacities at national and regional levels. CO 3: International fellowships for scientific mobility

Disaster Management (PGS 506)	CO1: Explains about Disaster Management- Efforts to mitigate natural disasters at national and global levels. CO2: International Strategy for Disaster reduction. Concept of disaster management, national disaster management framework; financial arrangements; role of NGOs, Community-based organizations, and media. CO3: Central, State, District and local Administration; Armed forces in Disaster response; Disaster response: Police and other organizations.
M.Sc. Ag. Entomology, 4th Sem.	
Master's Research (ENT 599)	CO 1: Identification of important pest problem of essential food and forage crops. CO 2: Minimizing the impact of those pests as major research objective, with emphasis on taxonomy, integrated management, toxicology etc.

M. Sc. Food Science and Technology	
Programme outcomes	The students get a systematic or coherent understanding of the fundamental concepts, principles, and processes underlying the academic field of food science and technology, its different subfields (food chemistry, nutrition, processing, engineering, etc.), and its linkages with related disciplinary areas/subjects; procedural knowledge that creates different types of professionals in the field of food science and technology and related fields such as food industry, teaching, research, product quality, consumer goods industry, food products, etc.; skills related to specialization areas within food science and technology, and other related fields of study, including broader interdisciplinary subfields(biotechnology, nanotechnology, etc.). Students will get the ability to recognize and appreciate the importance of the food sciences and their application in academic, industrial, economic, environmental, and social contexts.
Programme specific outcomes	The students acquire technical knowledge in post-harvest handling of food for its processing and storage. They will develop an ability to develop food products as well as their analysis in the contest to quality and its safety. The students develop sufficient technical knowledge to start up a food business.

Course Outcomes

M. Sc. 1st semester	
Courses	**Outcomes**
Food Chemistry & Nutrition (FST 501)	CO 1: To acquaint with properties and role of various constituents in foods, interaction and changes during processing. CO 2: Importance of various foods and nutrients in human nutrition.
Food Microbiology (FST 502)	CO 1: To acquaint with different groups of micro-organisms associated with food, their activities,destruction and detection in food. CO 2: Description of food hygiene and sanitation, food fermentations.
Principles of Food Processing (FST 504)	CO 1: To acquaint with Scope of food processing; historical developments and principles of food processing and preservation. CO 2: Description of processing and preservation by non-thermal methods. CO 3: Use and application of enzymes and microorganisms in processing and preservation of foods.
Technology of Fruits and Vegetable Processing (FST 512)	CO 1: To acquaint with principles and methods of preservation of fruits and vegetables into various products

	CO 2: Description of technology for processed products, dehydration of fruits and vegetables using various drying technologies.
Mathematics (FST 451)	CO 1: To provide basic knowledge and fundamentals of mathematics to provide a soundfoundation for engineering-related subjects. CO 2: Differential calculus, integral calculus, trigonometry, and two-dimensional geometry.
General Microbiology (FST 452)	CO 1: To provide basic knowledge about growth, reproduction, requirements of different groups of micro-organisms. CO 2: Leaning of techniques of isolation, identification, and enumeration of microorganisms.
M. Sc. 2nd semester	
Food Packaging Technology (FST 505)	CO 1: To acquaint the students with packaging methods, packaging materials, packaging machinery,modern packaging techniques, etc. CO 2: Description of properties of materials, Packaging equipment, and machinery.
Food Quality Systems & Management (FST 506)	CO 1: To acquaint with food quality parameters and control systems, food standards, regulations,specifications. CO 2: Description of Indian & International quality systems and standards like ISO and Food Codex.
Techniques in Food Analysis (FST 507)	CO 1: To acquaint with food quality parameters and control systems, food standards, regulations,specifications. CO 2: Sampling techniques, Chromatographic techniques, and Separation techniques.
Technology of Milk and Milk Products (FST 516)	CO 1: To acquaint with techniques and technologies of testing and processing of milk into variousproducts and by-products. CO 2: Technology of condensed milk, cream, ice cream, cheese, and Indigenous milk products.
Statistical Methods for Food Science (FST 531)	CO 1: Exposure of students to various statistical tools required to analyze the experimental datain food research and industry. CO 2: Descriptive statistics, estimation, and confidence intervals hypothesis testing.
M. Sc. 3rd semester	
Food Engineering (FST 503)	CO 1: To acquaint with the basic principle of food engineering and its processes, with the importance of various foods processes and their evaluation. CO 2: Description of a method for thermal process evaluation, food chilling and freezing, and process heat transfer.

Technology of Cereals, Pulses, and Oilseeds (FST 513)	CO 1: To acquaint with production and consumption trends, structure, composition, quality evaluation, and processing technologies for product development. CO 2: Description of the value addition of various cereals, pulses, and oilseeds.
Applied Nutrition (FST 534)	CO 1: To acquaint the students with the importance of nutrition, balanced diets, therapeutic diets for health. CO 2: Description of the role of food and nutraceuticals in health.
Master's seminar (FST 591)	CO 1: To develop presentation skills among students. CO 2: Presentation and discussion by each student on current topics/interests in Food Processing Technology.
Crop Production: Concepts and Practices (FST 553)	CO 1: To impart theoretical and practical knowledge about crop production under different agro-ecological conditions. CO 1: Quality of good seed, crop rotations, rain-fed agriculture, and dry farming.
M. Sc. 4th semester	
Industrial Training (FST 590)	CO 1: In-plant training is intended to expose the students to an environment in which they are expected to be associated in their future careers. CO 2: The students will gain hands-on experience in one or more commercial establishments.
Master Research (FST 599)	CO 1: To investigate selected problems of special interests in Food Technology by individual students. CO 2: The work includes library work, field or laboratory research, recording data, analyzing data, and writing a dissertation.

Programme

M.Sc. Ag. Genetics and Plant Breeding

Programme Outcomes	By the end of this course, students will able to determine breeding methodology appropriate for plants with different mating systems, conduct basic statistical analyses related to plant breeding, to identify characteristics of self- and cross-pollinated plants, identify sources of genetic variation to conduct a breeding program, analyse journal articles related to cultivar development, conduct and analyse a selection experiment, communicate background information and original ideas related to breeding a specific crop.
Programme specific outcomes	Students will care the plants and make sure they stay healthy. They will also assist in genetic research of plant breeding collect specimens and samples and grow cultures of micro-organisms, prepare specimens for examination and perform experiments, write reports on results and findings, check the quality of plants, set up and maintain instruments and equipment, set up, operate and maintain laboratories for botanical breeding.
M.Sc. Ag. Genetics and Plant Breeding Jobs	After getting degree, students can make career or get job in agriculture ministries, research laboratories, agricultural scientist, ICAR, CSIR institute, DBT, DST, crop research directorates, educational institutes, plant breeding centers, genetic engineering, biotechnology companies, crop plantation facilities, firms, nurseries, agriculture departments etc.

Course outcomes (COs)

Course	Course outcomes (COs)
M. Sc. Genetics and Plant Breeding (1st Sem.)	
Principles of Genetics (GP 501)	CO-1: A thorough understanding of the basic principles of DNA structure, replication, transcription and translation CO-2: An understanding of basic chromosome structure, and the significance of chromosomal change in evolution CO-3: Development of the ability to carry out genetic analyses on data sets comprised of codominant genetic markers such as allozymes, microsatellites and SNPs, in order to quantify variation, gene flow and evolutionary divergence CO-4: The ability to carry out complex genetic tests on genetic data for the purposes of diversity study CO-5: Apply the principles of inheritance to plant breeding
Principles of Cytogenetics (GP 502)	CO-1: Evolution of various chromosomal aberrations (structural and numerical), their applications in alien gene transfer and hybrid seed development. CO-2: Pollen culture in haploid development and development of diploid inbreeds or hybrids or doubled isogenic lines from haploids that has got important applications in plant breeding. CO-3: With cytogenetic tools such as FISH and GISH (Genomic In Situ Hybridization) techniques, that rely on "painted chromosomes" approach, the behaviour of individual genomes, individual chromosomes, or chromosomal

	fragments in natural and artificial hybrids (particularly allopolyploids) can be analysed. CO-4: Another important application of plant cytogenetics is in validation of physical maps and guiding efficient choice of bacterial artificial chromosomes for sequencing of genomes using chromosome walking and chromosome jumping.
Principles of Plant Breeding (GP 503)	CO-1: Students will be well versed in practical emasculation and pollination methods of important crops. CO-2: To understand the various components to structure a plant breeding programme CO-3: Know the requirements in breeding for biotic and abiotic stress tolerant varieties. CO-4: Learn the impact of IPRs including PBR, PVP and PPVFRA CO-5: Students will acquire independent ability to carry out statistical analysis of data and Interpretation of results in breeding programs.
M. Sc. Genetics and Plant Breeding (2nd Sem.)	
Principles of Quantitative Genetics (GP 504)	CO-1: Analyse and evaluate literature involving quantitative genetic experiment CO-2: Design and analyse quantitative genetic experiments CO-3: Statistically analyse the phenotypic data of plant traits collected taking into account G X E interaction. CO-4: Manage breeding populations to maximize progress from selection for accomplishment of breeding objectives
Cell Biology and Molecular genetics (GP 508)	CO-1: Understand and apply the principles and techniques of Molecular biology. CO-2: Comprehensive understanding on Nucleic acids that provides insight into cellular and molecular mechanisms. CO-3: The knowledge on DNA control mechanism in terms of replication and recombination to design and execute gene manipulation research underlying social and environmental ventures. CO-4: The ability to synthesize, evaluate and understand molecular marker-based data.
M. Sc. Genetics and Plant Breeding (3rd Sem.)	
Biotechnology for Crop improvement (GP 509)	CO-1: Ability to apply the concepts and principles of plant tissue culture techniques on research problems pertinent to crop improvement CO-2: Dissemination of skills on usage of the acquired knowledge on practical biotechnology tools to augment need based research. CO-3: Technical knowhow and exhibition of contemporary knowledge in Biotechnology for economic utilization. CO-4: Compile and interpret results applying tools of biotechnology research. CO-5: Applying learned process to undertake sustainable exploitation of plant and microbial resources in an environmentally-sensitive manner.
Heterosis Breeding	CO-1: Learn about mechanisms of heterosis.

(GP 507)	CO-2: understand Divergence and Genetic Distance analyses. CO-3: Development of inbreeds and parental lines CO-4: learn about hybrid seed production.

Programme outcomes Programme specific outcommes and course outcomes

M.Sc. Ag. Horticulture (Fruit Science)

M.Sc. Ag. Horticulture (Fruit Science) 1st semester	
Courses	**Outcomes**
Programme Outcome	1. After doing post- graduation in M.Sc. Ag. Horticulture (Fruit Science) the student become eligible to be appropriate for employment offered by bank, finance sectors, insecticide and pesticide companies, fertilizers companies, sales and marketing. 2. The Nationalized Banks, Reserve Bank, State Bank NABARD etc. put forward an opportunity for post-graduates in Agriculture and Horticulture as Agriculture Officers, Agriculture Assistant Officers, Probationary Officers, Field Officers and Rural Development Officers. 3. Different agricultural universities also employ horticultural post- graduates for different posts from the concerned field of their specialization as JRF, (Junior Research Fellowship), SRF (Senior Research Fellowship) TA (Technical Assistant) and Lab Assistant. 4. Indian Council of Agricultural Research and Department of Science and Technology (DST) also engage students in various posts according to their requirement. 5. National Horticulture Board also engage students in various posts according to their requirement. 6. Create job opportunities for the unemployed youths through teaching, research, training, extension etc., especially for the development of socially and economically depressed segment of society.
Programme Specific outcomes	1. Students having a combined knowledge of Fruit Science with entrepreneurial skill permit them to get administrative or marketing position with organizations involved in the processing and marketing of fruits, they also get recruited in the companies as horticulturist, gardeners, supervisors, farm managers, handling large scale production of certain varieties of fruits in various private seed companies. 2. Many fertilizers and pesticide companies engage students in their firms where they work as managers.

	3. At the International level, different agencies appoint horticultural consultants. 4. Individuals who have completed the post-graduate degree in Horticulture (Fruit Science) can work as farm or estate managers, supervisors, technical assistant and project coordinators. 5. After gaining experience, they will get positions of specialists for handling of fruit plantation, nursery and other orchard management project. 6. After gaining experience, they will increase farmers' income through adopting hi-tech horticulture.
Tropical and Dryland Fruit Production (FSC 501)	CO 1: After completion of the degree programme, the students will be able to transfer knowledge of horticulture in the field of agriculture research especially in horticulture including fruits plants and their management. CO 2: The students will be acquinted with the production technology of tropical and dryland fruit production. CO 3: To make them aware of the interculture operation of fruit crops and also to study the economics these tropical and dryland fruit crops along with the knowledge of diseases, pests and physiological disorders, mineral deficiency problems maturity indices for harvesting the crops and economics of the tropical and dryland fruit crops.
Subtropical and Temperate Fruit Production (FSC 502)	CO 1: The students will know about the package and practices of subtropical and temperate fruit crops along with the knowledge of diseases, pests and physiological disorders, mineral deficiency problems maturity indices for harvesting the crops and economics of the subtropical and temperate fruit crops CO 2: Development innovative agro- techniques to enhance the production and productivity of subtropical and temperate fruit crops. CO 3: After gaining experience, they will increase farmers' income through adopting hi-tech horticulture
Biodiversity and Conservation Of Fruit Crops (FSC 503)	CO 1: The students will know about biodiversity, conservation issues and exploitation of biological diversity through crop management. CO:2 . The students will be acquinted understanding the biodiversity, centers of origin of cultivated fruit crops. CO 3: The students will be acquinted with the quantify economic importance of plants in managed ecosystems and the impact of horticultural crops in food systems.
Canopy Management in Fruit Crops (FSC 504)	CO 1: To make them aware about impart knowlge about the principles and prctices in canopy management in fruit crops.

	CO 2: This course will provide knowledge about basic various equipment & tools used in canopy management of fruit crops. CO3 : To make them aware about canopy development and management in relation to growth , flowering, fruiting and fruit quality in temperate fruit and tropical or subtropical fruit crops.
Propagation and Nursery Management for Fruit Crops (FSC 505)	CO 1: This course will provide knowledge about basic familiarization with principles and practices of propagation and nursery management for fruit crops. CO 2: To make them aware about interculture operation for setting up of model nurseries in rural areas for availability of quality planting material. CO 3 : The students will know about life cycles in plants, cellular basis for propagation, sexual propagation, apomixis, polyembrony and chimeras.
Breeding of Fruit Crops (FSC 506)	CO 1: The students will be well- versed with different methods adopted for improvement of fruit crops, as well as the latest technology engaged in crop improvement for the benefit of humanity.
Biotecnoloy of Horticultural Crops (FSC 509)	CO 1: The students will know about the principles, theoretical aspects and developing skills in biotechnology of horticultural crops. CO 2: To make them aware about callus culture, cell division, differentiation, morphogenesis, organogenesis, embryogenesis and physiology of hardening
Job Prospects	On completion of degree there is an opportunity for post graduates in Fruit Science as Agriculture Officers, Agriculture Assistant Officers, Probationary Officers, Field Officers and Rural Development Officers. Students also recruited as JRF, (Junior Research Fellowship), SRF (Senior Research Fellowship) TA (Technical Assistant), Lab Assistant etc. bank, finance sectors, insecticide and pesticide companies, fertilizers companies, sales and marketing.
Research	1. M.Sc. Fruit Science student can pursure higher education Ph. D. 2. Students after completion of degree could be engaged in developing new and improved types of fruits. 3. Students could get in touch with the horticultural scientists who also devote considered time improve the aesthetics of ornamental and the quality of products.

Programme outcomes, Programme specific outcomes and course outcomes
M.Sc. Ag. Horticulture (Vegetable Science)

Programme Outcome	**1.** After doing post-graduation in M.Sc. Ag. Horticulture (Vegetable Science) the student becomes eligible to be appropriate for employment offered by banks, finance sectors, seed companies, insecticide and pesticide companies, sales and marketing etc. **2.** The nationalized banks, Reserve Bank, State Bank, NABARD etc. put forward an opportunity for post graduates in agriculture and horticulture as Agricultural Officers, Probationary Officers, Field Officers and Rural Development Officers. **3.** Different agricultural universities also employ horticultural postgraduates for distinct posts from the concerned field of their specialization as SRF's (Senior Research Fellow), TA (Technical Assistant) etc. **4.** Indian Council of Agricultural Research and Department of Science and Technology (DST) also engage students in different posts according to their requirement.
Programme specific outcomes	**1.** Students having a combined knowledge of Vegetable Science with entrepreneurial skills enable them to get administrative or marketing positions with organizations involved in the processing and marketing of vegetables, they also get recruited in the companies as horticulturists, gardeners, supervisors, farm or estate managers, handling large scale production of certain varieties of vegetables in various private seed companies etc. **2.** Many fertilizer and pesticide companies engage students in their firms where they work as managers. **3.** At the International level, different agencies appoint horticultural consultants. **4.** And other different positions as per their requirement.
Course M.Sc. Ag. Horticulture (Vegetable Science) Outcomes	
VSC-501 (Production Technology of Cool Season Vegetable Crops)	❖ The students will be acquainted with the production technology of important cool season vegetable crops. ❖ To make them aware of the intercultural operations of winter vegetables and also to study the economics of these cool season vegetable crops.
VSC-502 (Production Technology of Warm Season Vegetable Crops)	❖ The students will know about the package of practices of the warm season vegetables along with the knowledge of physiological disorder, mineral deficiency problems, maturity standards for harvesting the crops and economics of these warm season vegetable crops.
VSC-503 (Breeding of Vegetable Crops)	❖ The students will be well-versed with various methods adopted for improvement of vegetable crops, as well as the latest technology engaged in crop improvement for the benefit of humanity.
VSC-504 (Growth and Development of Vegetable Crops)	❖ This course will provide knowledge about basic cell functions, growth and development stages, roles and applications of plant growth regulators. It will also acquaint the students with basic physiological processes involved in flowering, fruit set and environmental factors associated.
VSC-505 (Seed Production Technology of Vegetable Crops)	❖ The students will be acquainted with importance of quality seed production, various methods of seed production in self and open pollinated vegetable crops.
VSC-507 (Production Technology of Underexploited Vegetable Crops)	❖ The students will be well versed with nutritional importance and package of practices of underexploited vegetables so as to enhance their production.

VSC-508 (Organic Vegetable Production Technology)	❖ Student will understand the concepts of organic farming. Use of various organic inputs for vegetable production, use of non-synthetic agents for crop production, will get some idea about organic certification.
VSC-509 (Fundamentals of Processing of Vegetables)	❖ The students will know the various ways for value addition in vegetable crops
Job Prospects	On completion of degree there is an opportunity for post graduates in Vegetable Science as Agricultural Officers, Probationary Officers, Field Officers and Rural Development Officers. Students are also recruited as SRF's (Senior Research Fellow), TA (Technical Assistant) etc. Banks, finance sectors, seed companies, insecticide and pesticide companies, sales and marketing etc.
Research	**1.** M.Sc. Vegetable student can pursue higher education Ph.D. **2.** Student after completion of degree could be engaged in developing new and improved types of vegetables. **3.** Students could get in touch with the horticultural scientists who also devote considerable time to improve the aesthetics of ornamentals and the quality of products.

Programme outcomes Programme specific outcommes and course outcomes

M.Sc. Ag. Horticulture (Floriculture and Landscape Architecture)

M.Sc. Ag. Horticulture (Floriculture and Landscape Architecture)	
Programme Outcomes	1. After doing post- graduation in M.Sc. Ag. Horticulture (Floriculture and Landscape Architecture) the student become eligible to be appropriate for employment offered by bank, finance sectors, insecticide and pesticide companies, fertilizers companies, sales and marketing. 2. The Nationalized Banks, Reserve Bank, State Bank NABARD etc. put forward an opportunity for post-graduates in Agriculture and Horticulture as Agriculture Officers, Agriculture Assistant Officers, Probationary Officers, Field Officers and Rural Development Officers. 3. Different agricultural universities also employ horticultural post- graduates for different posts from the concerned field of their specialization as JRF, (Junior Research Fellowship), SRF (Senior Research Fellowship) TA (Technical Assistant) and Lab Assistant. 4. Indian Council of Agricultural Research and Department of Science and Technology (DST) also engage students in various posts according to their requirement. 5. National Horticulture Board also engage students in various posts according to their requirement. 6. Create job opportunities for the unemployed youths through teaching, research, training, extension etc., especially for the development of socially and economically depressed segment of society.
Programme Specific outcomes	1. Students having a combined knowledge of Floriculture and Landscape Architecture with entrepreneurial skill permit them to get administrative or marketing position with organizations involved in the marketing of flowers and cut flowers, they also get recruited in the companies as horticulturist, gardeners, supervisors, farm managers, handling large scale production of certain varieties of fruits in various private seed companies. 2. Many fertilizers and pesticide companies engage students in their firms where they work as managers.

	3. At the International level, different agencies appoint horticultural consultants. 4. Individuals who have completed the post-graduate degree in Horticulture (Fruit Science) can work as farm or estate managers, supervisors, technical assistant and project coordinators. 5. After gaining experience, they will get positions of specialists for handling of fruit plantation, nursery and other orchard management project. 6. After gaining experience, they will increase farmers' income through adopting hi-tech horticulture.
Course Outcomes	**Outcomes**
Breeding of Flower Crops and Ornamental Plants (FLA 501)	CO 1: The students will be well- versed with different methods adopted for improvement of flower crops and ornmental plants, as well as the latest technology engaged in crop improvement for the benefit of humanity.
Production Technology of Cut Flowers (FLA 502)	CO 1: The students will know about the package and practices of production technology of cut flower along with the knowledge of diseases, pests and physiological disorders, mineral deficiency problems, maturity indices for harvesting the crops and economics of the cut flowers. CO 2: Development innovative agro- techniques to enhance the production and productivity of cut flowers. CO 3: After gaining experience, they will increase farmers' income through adopting hi-tech horticulture.
Production Technology of Loose Flowers (FLA 503)	CO 1: To make them aware about impart knowlge about the importance and management of loose flowers. CO 2: The students will be acquinted understanding the scope of loose flowers trade, significance in the domestic market and export. CO 3: To make them aware knowlge about the water, nutrient management, weed management, pinching, disbudding , special horticultural practices and production for special occasions through physiological interventations.
Landscaping and Ornamental Gardening (FLA 504)	CO 1: To make them aware knowlge about the familiarization with principles and practices of landscapeing and ornamental gardening. CO 2 : This course will provide knowledge about landscape desings & styles of garden, formal, infornmal and free style gardens. CO 3 : To make them aware about garden plant components arboretum, shrubbery, fernery, palmatum and production technology for selected ornamental plants.

Protected Floriculture (FLA 505)	CO 1: This course will provide knowledge about the protected floriculture, types structure – greenhouse, polyhouse and shade house economics of flowers crops for protected cultivation. CO 2: To make them aware about interculture operation for environmental control, management and manipulation of temperatue, ligh, humidity, air and CO_2 heating and cooling system in the naturally ventilated greenhouses. CO 3 : The students will know about containers, substrates soil decontamination, layout of dripand fertigation system.
Value Addition in Flowers (FLA 506)	CO 1: This course will provide knowledge about the prospects of value addition, National and global scenario, production and export, womens empowerment through value added products making and supply chain management. CO 2: To make them aware about the prolong the post harvest storage life of horticultural commodities and increase income through value addition of the products and to reduce post harvest losse.
Turfing and Turf Management (FLA 507)	CO 1: Students will learn about the principles and management of turfing. CO 2: To make them aware about preparatory operations, growing media used for turf grasses, turf established method.
Job Prospects	On completion of degree there is an opportunity for post graduates in Floriculture and Landscape Architecture as Agriculture Officers, Agriculture Assistant Officers, Probationary Officers, Field Officers and Rural Development Officers. Students also recruited as JRF, (Junior Research Fellowship), SRF (Senior Research Fellowship) TA (Technical Assistant), Lab Assistant etc. bank, finance sectors, insecticide and pesticide companies, fertilizers companies, sales and marketing.
Research	1. M.Sc. Floriculture and Landscape Architecture student can pursure higher education Ph. D. 2. Students after completion of degree could be engaged in developing new and improved types of fruits. 3. Students could get in touch with the horticultural scientists who also devote considered time improve the aesthetics of ornamental and the quality of products.

PROGRAM OUTCOMES, PROGRAM SPECIFIC OUTCOMES, COURSE OUTCOMES

M.Sc. Ag. Plant Pathology

Program outcome	Plant Pathologist commonly work with plant breeders, farmers, entomologists, and botanists in the farms and gardens where plants grow. Additionally, plant pathologists engage with biological scientists and engineers to create safer living arrangements to allow plants to reach their maximum growth, yield and having potential to boost the Indian agriculture economy.
Program specific outcomes	Students of Plant Pathology comprises with the basic knowledge and technologies of Botany, Plant Anatomy, Plant Physiology, Mycology, Bacteriology, Virology, Nematology, Genetics, Molecular Biology, Genetic Engineering, Biochemistry, Horticulture, Tissue Culture, Soil Science, Forestry, Physics, Chemistry, Meteorology, Statistics and many other branches of applied science.
COURSE OUTCOMES	**M.SC. (PLANT PATHOLOGY) PROGRAM**
COURSE: MYCOLOGY (PL PATH-501)	
CO1.	Describe the introduction, definition of different terms and ba concepts of mycology
CO2.	Elaborate the importance of mycology in agriculture, relation of fungi to human affairs and historical landmarks of mycology.
CO3.	Elaborate the concepts of nomenclature and classification, fungal biodiversity, reproduction in fungi.
CO4.	Explain the comparative morphology, ultrastructure, characters of different groups of fungi up to generic level: (a) Myxomycota and (b) Eumycota- i) Mastigomycotina ii) Zygomycotina, iii) Ascomycotina, iv) Basidiomycotina, v) Deuteromycotina.
CO5.	Define the Lichens, its types and importance, fungal genetics and variability in fungi.
COURSE: PLANT VIROLOGY (PL PATH-502)	
CO1.	Scientific knowledge: Apply the knowledge of plant viruses in terms of composition , structure and nature of plant viruses
CO2.	To study physical and chemical properties, symptomatology, transmission nature, how plant plant viruses spread from place to another places
CO3.	Detail classification, nomenclature, replication of plant viruses in plant system
CO4.	Understand the basic concept of isolation and purification of plant viruses with help of SEM and TEM microscope
CO5.	Perform procedures and working of electron microscope and ultra-microtome and understand the basic concept of different organisms

	related to viruses such as baculoviruses, RNA phages, Satellite viruses, prions etc.
CO6.	To understand the basic concept of genetic engineering, mechanism of resistance and management of plant viruses
COURSE: PLANT BACTERIOLOGY (PL PATH-503)	
CO1.	Develop a understanding of importance of phytopathogenic bacteria and to study in detail about different phytopathogenic bacteria such as MLOs, spiroplasmas, fastidious bacteria
CO2.	Develop an procedure for understanding of evolution, classification and nomenclature of plantpathogenic bacteria
CO3.	Describe a procedure for understanding of growth nutrients, reproduction and preservation of bacterial cultures
CO4.	Understand the general biology of bacteriophages, L form bacteria and plasmids
CO5.	Describe mode of action of prokaryotic inhibitors
CO6.	Develop an understanding of survival and dissemination of plant pathogenic bacteria
COURSE: PRINCIPLES OF PLANT PATHOLOGY (PL PATH-504)	
CO1.	Describe in detail definations, concept, history of plant disease.Provide basic understanding about biotic and abiotic factors and causes of plant disease
CO2.	Develop an understanding about growth, reproduction and role of environment in plant diseases
CO3.	Enumerate and explainrecognition concept and infection, symptomatology, disease development- role of enzymes, toxins, growth regulators; defense strategies- oxidative burst; Phenolics, Phytoalexins, PR proteins, Elicitors. Altered plant metabolism as affected by plant pathogens
CO4.	Develop an understanding about genetics of resistance; 'R' genes; mechanism of genetic variation in pathogens; molecular basis for resistance; marker-assisted selection; genetic engineering for disease resistance.
CO5.	Explain in detail different plant management strategies
COURSE: DETECTION AND DIAGNOSIS OF PLANT DISEASES (PL PATH 505)	
CO1.	Describe the methods to prove Koch's postulates with biotroph and necrotroph pathogens, pure culture techniques, use of selective media to isolate pathogens.
CO2.	Explain the preservation of plant pathogens and disease specimens, use of haemocytometer, micrometer, centrifuge, pH meter, cameralucida.

CO3.	Describe the microscopic techniques and staining methods, phase contrast system, chromatography, use of electron microscope, spectrophotometer, ultracentrifuge and electrophoretic apparatus, disease diagnostics, serological and molecular techniques for detection of plant pathogens.
CO4.	Understanding of evaluation of fungicides, bactericides etc.; field experiments, data collection and preparation of references.
COURSE: PRINCIPLES OF PLANT DISEASE MANAGEMENT (PL PATH 506)	
CO1.	Explain the principles of plant disease management by cultural, physical, biological, chemical, organic amendments and botanicals methods of plant disease control, integrated control measures of plant diseases.
CO2.	Describe the disease resistance and molecular approach for disease management.
CO3.	Describe the foliage, seed and soil application of chemicals, role of stickers, spreaders and other adjuvants, health vis-a-vis environmental hazards, residual effects and safety measures
CO4.	Understanding of history of fungicides, bactericides, antibiotics, concepts of pathogen, immobilization, chemical protection and chemotherapy, nature, properties and mode of action of antifungal, antibacterial and antiviral chemicals
COURSE: INTEGRATED DISEASE MANAGEMENT (PL PATH 516)	
CO1.	Describe the introduction, definition, concept and tools of disease management, components of integrated disease management- their limitations and implications.
CO2.	Understanding the development of IDM- basic principles, biological, chemical and cultural disease management.
CO3.	Understanding the IDM in important crops- rice, wheat, cotton, sugarcane, chickpea, rapeseed- mustard, pearlmillet, *kharif* pulses, vegetable crops and fruit crops.
COURSE: LIBRARY AND INFORMATION SERVICES (PGS-501)	

CO 1.	To understand Introduction to library and its services; Role of libraries in education, research and technology transfer; Classification systems and organization of library; Sources of information- Primary Sources, Secondary Sources and Tertiary Sources; Intricacies of abstracting and indexing services (Science Citation Index, Biological Abstracts, Chemical Abstracts, CABI Abstracts, etc.); Tracing information from reference sources; Literature survey; Citation techniques/Preparation of bibliography; Use of CD-ROM Databases, Online Public Access Catalogue and other computerized library services; Use of Internet including search engines and its resources; eresourcesaccess methods.
COURSE: TECHNICAL WRITING AND COMMUNICATIONS SKILLS (PGS-502)	
CO1.	Various forms of scientific writings- theses, technical papers, reviews, manuals, etc; Various parts of thesis and research communications (title page, authorship contents page, preface, introduction, review of literature, material and methods, experimental results and discussion). Grammar (Tenses, parts of speech, clauses, punctuation marks); Error analysis (Common errors); Concord; Collocation; Phonetic symbols and transcription; Accentual pattern: Weak forms in connected speech: Participation in group discussion: Facing an interview; presentation of scientific papers.
COURSE: EXPERIMENTAL DESIGNS (SPG-502)	
CO1.	To understand various uniformity trials, size and shape of plots and blocks; Analysis of variance; Completely randomized design, randomized block design and Latin square design.Split plot and strip plot designs; Analysis of covariance and missing plot techniques in randomized block and Latin square designs; Transformations, crossover designs, balanced incomplete block design, resolvable designs and their applications ~ Lattice design, alpha design - concepts, randomisation procedure, analysis and interpretation of results. Response surfaces. Experiments with mixtures.
COURSE: INTELLECTUAL PROPERTY AND ITS MANAGEMENT IN AGRICULTURE (PGS-503)	
CO1.	To understand historical perspectives and need for the introduction of Intellectual Property Right regime; TRIPs and various provisions in TRIPS Agreement; Intellectual Property and Intellectual Property Rights (IPR), benefits of securing IPRs; Indian Legislations for the protection of various types of Intellectual Properties; Treaty on Plant Genetic Resources for Food and Agriculture; Licensing of technologies, Material transfer agreements, Research collaboration Agreement, License Agreement.
COURSE: BASIC CONCEPTS IN LABORATORY TECHNIQUES (PGS-504)	
CO1.	Safety measures while in Lab; Handling of chemical substances; Use of burettes, pipettes, measuring cylinders, flasks, separatory funnel, condensers, micropipettes and vaccupets; washing, drying and sterilization of glassware; Drying of solvents/chemicals. Weighing and

	preparation of solutions of different strengths and their dilution; Handling techniques of solutions; Preparation of different agrochemical doses in field and pot applications; Preparation of solutions of acids; Neutralisation of acid and bases; Preparation of buffers of different strengths and pH values. Use and handling of microscope, laminar flow, vacuum pumps, viscometer.
COURSE: REMOTE SENSING & GEOGRAPHIC INFORMATION SYSTEM (SPG 503)	
CO1.	The use of arieal photography, satellite imagery and geographic information syatem for the collection, strorage and spatial analysis for geo-reference.Future prospects of remote sensing in India, software used in remote sensing, GIS versus remote sensing, Introduction to GIS software.
COURSE: AGRICULTURAL DEVELOPMENT PROGRAMMES (PGS-505)	
CO1.	To understand history of agriculture in brief; Global agricultural research system: need, scope, opportunities; Role in promoting food security, reducing poverty and protecting the environment; National Agricultural Research Systems (NARS) and Regional Agricultural Research Institutions; Consultative Group on International Agricultural Research (CGIAR): International Agricultural Research Centres (IARC), partnership with NARS, role as a partner in the global agricultural research system, strengthening capacities at national and regional levels; International fellowships for scientific mobility
COURSE: DISASTER MANAGEMENT (PGS-506)	
CO1.	Disaster Management- Efforts to mitigate natural disasters at national and global levels. International Strategy for Disaster reduction. Concept of disaster management, national disaster management framework; financial arrangements; role of NGOs, Community-based organizations, and media. Central, State, District and local Administration; Armed forces in Disaster response; Disaster response: Police and other organizations.
COURSE: CASSIFICATION OF INSECTS (ENT-504)	
CO1.	Brief evolutionary history of Insects- introduction to phylogeny of insects and Major Classification of Superclass Hexapoda–Classes – Ellipura (Collembola, Protura), Diplura and Insecta- Orders contained.Distinguishing characters, general biology, habits and habitats of Insect orders and economically important families contained in them (Continued). Subclass: Pterygota, Division: Neoptera: Subdivision: Orthopteroid and Blattoid Orders (=Oligoneoptera: Plecoptera, Blattodea, Isoptera, Mantodea, Grylloblattodea, Dermaptera, Orthoptera, Phasmatodea, Mantophasmatodea, Embioptera, Zoraptera), Subdivision: Hemipteroid Orders (=Paraneoptera): Psocoptera, Phthiraptera, Thysanoptera and Hemiptera.Distinguishing characters, general biology, habits and habitats of Insect orders and economically

	important families contained in them (Continued). Division Neoptera – Subdivision Endopterygota, Section Neuropteroid- Coleopteroid Orders: Strepsiptera, Megaloptera, Raphidioptera, Neuroptera and Coleoptera, Section Panorpoid Orders Mecoptera, Siphonaptera, Diptera, Trichoptera, Lepidoptera, and Section Hymenopteroid Orders: Hymenoptera.
COURSE: PRINCIPLES OF INTEGRATED PEST MANAGEMENT (ENT-510)	
CO1.	Concept and philosophy, ecological principles, economic threshold concept, and economic consideration.Political, social and legal implications of IPM; pest risk analysis; pesticide risk analysis; cost-benefit ratios and partial budgeting; case studies of successful IPM programmes.Tools of pest management and their integration-legislative, cultural, physical and mechanical methods; pest survey and surveillance, forecasting, types of surveys including remote sensing methods, factors affecting surveys.
COURSE: TECHNIQUES IN PLANT PROTECTION (ENT-518)	
CO1.	Pest control equipments, principles, operation, maintenance, selection, application of pesticides and biocontrol agents, seed dressing, soaking, root-dip treatment, dusting, spraying, application through irrigation water.Protein isolation from the pest and host plant and its quantification using spectrophotometer and molecular weight determination using SDS/PAGE.Computer application for predicting/forecasting pest attack and identification.

M. Tech. Food Technology	
M. Tech. Food Technology	
Programme outcomes	Students will get the ability to apply principles of food engineering in industry, understand, identify and analyze the problem related to the food industry and ability to find an appropriate solution for the same. They will be able to design, implement and evaluate a research-based project to meet demands of the society. Students will get the ability to use appropriate techniques, skills, and modern tools in the food industry and the academic profession. They will get the proper understanding of professional, ethical, legal, security, and social issues and responsibilities for entrepreneurship skills.
Programme specific outcomes	Students acquire in-depth theoretical and practical knowledge of mathematics, food science, and engineering. They will get proficiency in solving engineering problems related to the food industry and focus on the importance of safe processed nutritious food. They will develop an ability to work in Food industries, research organizations and academia as well as to design or process food products as per the needs and specifications.

Course Outcomes

M. Tech. 1st semester	
Courses	**Outcomes**
Advances in Food Chemistry & Nutrition (FST 601)	CO 1: Interactions among food components and water relationships in foods. CO 2: Description of fragrance and flavouring compounds. CO 3: Description of therapeutic, parenteral and geriatric nutrition and relevant food formulations and chemistry of alkaloids, flavonoids and other phenolics.
Modern Food Microbiology (FST 602)	CO 1: Factors influencing the development of microbes in food. CO 2: Microbial behavior against the newer methods of food processing. CO 3: Modern methods of cell culture, cell immobilization, and applications.
Food Processing (FST 604)	CO 1: To develop an insight among the students about the existing modern techniques and their applications in food processing. CO 2: Description of membrane technology, microwave and radio frequency processing and high-pressure processing. CO 3: Application of newer techniques in food processing.

Juice Processing Technology (FST 623)	CO 1: To understand the fundamentals of juice processing technology CO 2: To acquaint with various equipment & tools for juice extraction
Library and Information Services (PGS-501)	CO 1: Introduction to library and its services and role of libraries in education, research, and technology transfer CO 1: Use of CD-ROM Databases, Online Public Access Catalogue, and other computerized library services
Technical Writing and Communications Skills (PGS-502)	CO 2: To equip the students/scholars with skills to write dissertations, research papers, etc. CO 3: To equip the students/scholars with skills to communicate and articulate in English (verbal as well as writing).
M. Tech. 2nd semester	
Food Packaging (FST 605)	CO 1: Learning of active and intelligent packaging. CO 2: Description of non-migratory bioactive polymers (NMBP) in food packaging. CO 3: Description of modern packaging systems such as green plastics for food packaging.
Food Analysis (FST-606)	CO 1: To develop an understanding and methodologies of instrumental techniques in food analysis. CO 2: Application and operating parameters of a spectrophotometer, AAS, GC, HPLC, NMR, FTIR, GC-MS, LC-MS.
Food Quality Systems & Management (FST 607)	CO 1: To acquaint with food quality parameters and control systems, food standards, regulations, specifications. CO 2: Concepts of Total Quality Management, sanitary and hygienic practices. CO 3: Description of laboratory quality procedures and assessment of laboratory performance.
Confectionary Technology (FST 630)	CO 1: To provide an understanding of various classes of confectionary products, their manufacture, and quality aspects. CO 2: Description of chocolate processing technology, sugar confectionery manufacture, and flour confectionery.
Statistical Methods for Food Science (FST 531)	CO 1: Exposure to various statistical tools required to analyze the experimental data in food research and industry. CO 2: Descriptive statistics, estimation, and confidence intervals hypothesis testing.
Intellectual Property and Its Management in Agriculture (PGS-503)	CO 1: To equip students and stakeholders with knowledge of intellectual property rights (IPR), related protection systems, their significance, and the use of IPR as a tool for wealth and value creation in a knowledge-based economy.

	CO 2: Learning of Indian legislations for the protection of various types of intellectual properties.
Basic Concepts in Laboratory Techniques (PGS-504)	CO 1: To acquaint the students with the basics of commonly used techniques in the laboratory. CO 2: Preparation of solutions of acids, bases, buffers, tissue culture, etc.
M. Tech. 3rd semester	
Advances in Food Engineering (FST-603)	CO 1: To acquaint with recent advances in food engineering and its processes. CO 2: Engineering properties of foods, their significance in equipment design. CO 3: Theory of ultra-filtration and reverse osmosis.
Equipment Design & Process Control (FST 608)	CO 1: To introduce basic equipment design and various process control mechanisms and related engineering aspects. CO 2: Design of vessels, food storage tank, and heat exchangers. CO 3: Instrument terminology, performance system accuracy, and introduction to programmable logic controllers (PLC).
Nutraceuticals & Health Foods (FST 612)	CO 1: To cater to the newly emerging area of nutraceuticals with respect to the types and mechanisms of action. CO 2: Description of the manufacturing process of selected nutraceuticals, product development, clinical testing, and toxicity aspects.
Business Management & International Trade (FST-533)	CO 1: To acquaint with techniques of business management & international trade for the food sector. CO 2: Concept and functions of marketing, market measurement, and advertising.
Master's seminar (FST 591)	CO 1: To develop presentation skills among students CO 2: Presentation and discussion by each student on current topics/interests in Food Processing Technology
Agricultural Research, Research Ethics and Rural Development Program (PGS 505)	CO 1: To enlighten the students about the organization and functioning of agricultural research systems at national and international levels CO 2: research ethics, and rural development programs and policies of Government.
Disaster Management (PGS 506)	CO 1: To introduce learners to the key concepts and practices of natural disaster management; CO 2: To equip them to conduct a thorough assessment of hazards, and risks vulnerability; and capacity building.
M. Tech. 4th semester	

Industrial Training (FST 590)	CO 1: In-plant Training is intended to expose the students to an environment in which they are expected to be associated in their future careers. CO 2: The students will gain hands-on experience in one or more commercial establishments.
Master Research (FST 699)	CO 1: To investigate selected problems of special interests in Food Technology by individual students. CO 2: The work includes library work, field or laboratory research, recording data, analyzing data, and writing of a dissertation.

PROGRAM OUTCOMES, PROGRAM SPECIFIC OUTCOMES, COURSE OUTCOMES
Ph. D. Entomology

Programme outcome	Entomologists commonly work with Plant Breeders, Farmers, Agronomists, Horticulturists, Pathologists etc. in the fields, farms and gardens wherever plants grow. Additionally, Entomologists engage with biological scientists and engineers to create safer living arrangements and achieve high yield and potential boost to the Indian agriculture economy.
Programme specific outcome	Expertise in the identification, life history and ecology of insect pests and predators/ parasites as well as the basic principles and strategies of their management. Aspirants of Entomology, comprises with the basic knowledge and technologies used in Apiculture, Nematology, Sericulture, Biological control Toxicology, Economic Entomology etc. Interdisciplinary research work is also being carried out, with the different departments like Plant Pathology, Biochemistry, Molecular biology, Soil science, Horticulture, Agronomy etc. The knowledge acquired and skill developed in the field of entomology, help in recognizing the applications of latest technologies in all spheres of agriculture and develop crops with improved productivity thereby increasing farmers' income, better human health and decreased environmental pollution as well as meet out the future challenges in agricultural crops and storage grains.
COURSE: Ph.D. Entomology	**OUTCOMES**
Ph.D. Entomology 1st Sem.	
Major	
Advanced Insect Systematics (ENT 601)	CO 1: Familiarize the students with different schools of classification. CO2: Phylogenetics, classical and molecular methods, evolution of different groups of insects. CO 3: International Code of Zoological Nomenclature. CO 4: Ethics and procedure for taxonomic publications.
Immature Stages of Insects (ENT 602)	CO 1: Impart knowledge on morphology of immature stages of different groups of insects. CO 2: Train students in identification of common pest species during their immature stages.
Advanced Insect Physiology (ENT 603)	CO 1: Impart knowledge to the students on detailed physiology of various secretory and excretory systems. CO 2: Description of moulting process, chitin synthesis, CO 3: Description of physiology of digestion, transmission of nerve impulses. CO 4: Description of nutrition of insects, pheromones etc.

Advanced Insect Ecology (ENT 604)	CO 1: Impart advanced practical knowledge of causal factors governing the distribution and abundance of insects CO 2: Description of the evolution of ecological characteristics.
Minors	
	The student shall have the option to take two split minor subjects depending upon his / her research problem (minimum 8 credit hours) in the related subjects viz. Plant Pathology, Agronomy, Soil Science, Vegetable Science and Fruit Science in 500 series courses
Ph.D. Entomology, 2nd Sem.	
Major	
Recent Trends in Biological Control (ENT 606)	CO 1: Appraise the students with advanced techniques in handling of different bio-agents CO 2: Described modern methods of biological control CO 3: Scope of bio-agents in cropping system-based pest management in agro-ecosystems.
Advanced Insecticide Toxicology (ENT 607)	CO1: Acquaint the students with the latest advancements in the field of insecticide toxicology. CO2: Describe the biochemical and physiological target sites of insecticides CO 3: Explained the pesticide resistance mechanisms in insects.
Advanced Insect Pest Management (ENT 612)	CO 1: Acquaint the students with recent concepts of integrated pest management. CO 2: Surveillance and data base management. CO 3: Successful national and international case histories of integrated pest management CO 4: Role of non-conventional tools in pest management.
Minor	
	The student shall have the option to take two split minor subjects depending upon his/ her research problem (minimum 8 credit hours) in the related subjects viz. Plant Pathology, Agronomy, Soil Science, Vegetable Science and Fruit Science in 500 series courses
Supporting course	
	The student shall have the option to take minimum five credits in the supporting subject in 500 series courses. The supporting subject will not be related to the major subject. It could be any subject considered relevant for student's research work
Ph.D. Entomology, 3rd Sem. onwards	
Doctoral Research (ENT 699)	CO 1: Identification of important pest problem of essential food and forage crops. CO 2: Minimizing the impact of those pests as major research objective, with emphasis on taxonomy, molecular studies, integrated management, toxicology etc.

Ph.D. Food technology

Program outcomes	PO 1: Substantive knowledge in an area of concentration that allows for application to a relevant area of food science. PO 2: Application of critical thinking to food components and complex food systems including experimental design and completion of experiments. PO 3: Produce and defend an original significant contribution to knowledge. PO 4: Demonstrate mastery of subject material through a thesis defense and preparation of one or more manuscripts for peer review in a scientific journal (s). PO 5: Conduct scholarly or professional activities in an ethical manner. PO 6: Develop teaching skill as a Teaching Assistant.
Program specific outcomes	PSO 1: To get research opportunities in multiple fields including Nutrition, Dietetics, Food Chemistry, Toxicology, etc. PSO 2: The research related to Food Science and Technology has a very high demand. With the growing health awareness, the demand for this research is expected to grow more in the future. PSO 3: The students get ample job opportunities in government research centers, food quality testing centers, etc. PSO 4: The candidates get opportunities to work as faculty members (professors and lecturers) in both government and private colleges and universities. PSO 5: The candidates with Ph.D. Food Technology gets opportunities to start their start-ups in the form of laboratories, Research Centres, Nutrition clinics, etc.

Course outcomes	
Courses	**Outcomes**
Research Methodology (FT-609)	CO 1: Learning of different methodologies and techniques used in research work. CO 2: To know the basic computer skills necessary for the conduct of research. CO 3: To understand the basic function and working of analytical instruments used in research CO 4: Understanding of required numerical skills necessary to carry out research.
Advances in Food Analysis and Quality Control (FT-611)	CO 1: To develop an understanding of the advanced analytical and instrumental techniques. CO 2: To illustrate the principle and mechanism of analytical instruments.

	CO 3: To describe the bio-chemical analysis of food components.
Recent Advances in Cereals, Pulses & Oilseeds Processing (FT-612)	CO 1: To understand the storage and handling of food grains. CO 2: To illustrate quality testing of wheat grain and the milled product (flour, dough, etc.). CO 3: To acquaint with the milling techniques of cereals such as wheat, rice, maize, pseudocereals, and pulses and extraction of oil from oilseeds. CO 4: To identify the problems associated with the milling of grains and their solution. CO 5: To know the techniques for processing food grains into value-added products.
Recent Advances in Fruits & Vegetables Processing (FT-613)	CO 1: To illustrate the relationship of the Indian economy concerning the fresh and processed fruits and vegetables and their spoilages. CO 2: To acquaint with the post-harvest handling technologies of fruits and vegetables to reduce postharvest losses and their value addition. CO 3: To illustrate the technological advances in thermal processing of fruit and vegetable. CO 4: To acquaint with advances in byproduct utilization.
Recent advances in Food Processing and Technology (FT-614)	CO 1: To illustrate the techniques involved in food processing such as Microwave and Radio Frequency Processing, High-Pressure processing, Ultrasonic Processing, etc. CO 2: To acquaint with principles and applications of Hurdle Technology. CO 3: To illustrate the newer techniques such as high-intensity light, pulsed electric field, ohmic heating, IR heating, inductive heating, and pulsed X-rays in food processing and preservation.
Recent Advances in Dairy Science & Technology (FT-615)	CO 1: To illustrate the technologies of processing milk and milk products. CO 2: To describe the design and working of equipment used in dairy science & technology. CO 3: To elucidate the thermal processing of milk and quality changes therein. CO 4: To explain the manufacturing processes of dairy products, and by-products as well as the hygiene and sanitation practices in a milk plant.
Recent Advances in Food	CO 1: To describe the status of biotechnology in India about

Biotechnology (FT-616)	food technology and its general applications. CO 2: To illustrate the processes of fermentation and fermenter design as well as production of alcoholic beverages. CO 3: To acquaint with genetic engineering and genetically modified foods and their safety concerns.

PROGRAM OUTCOMES, PROGRAM SPECIFIC OUTCOMES, COURSE OUTCOMES

Ph.D. PUNJABI

Program Outcome	1. To be able and capable of holding various posts of Assistant Professor in government and semi-government Colleges/ Universities of Punjab, Haryana, Chandigarh, Delhi and Rajasthan. 2. Opportunities for projects by various Government and funded agencies in the field of culture and folklore in context of Punjab and Himachal Pradesh such as Indian Institute of advanced Study Shimla (IIAS). 3. Eligibility for the posts of Principal and Lecturer of Various Government Colleges/schools in Punjab, Haryana and Chandigarh. 4. Eligibility for a number of PDF research opportunities under UGC and MHRD after completing Ph.D. 5. Unlimited potential in print media and electronic media, such as newspaper editors, news readers and anchors on Television and as will as Radio broadcasting.
Program Specific Outcome	Being able to get special information about various aspects of Punjabi Language, Folklore, Art & Culture.
Course: Ph. D. Punjabi	**Outcomes – ਹੇਠਾਂ ਦਿੱਤੇ ਕੋਰਸਾਂ ਵਿਚੋਂ ਪੀਐਚ.ਡੀ. ਦੇ ਕੋਰਸ-ਵਰਕ ਲਈ ਖੋਜਾਰਥੀ ਲਈ ਖੋਜ-ਵਿਧੀ ਅਧਿਐਨ (PBI-609) ਕੋਰਸ ਪੜ੍ਹਨਾ ਲਾਜ਼ਮੀ ਹੈ ਜਦੋਂ ਕਿ ਬਾਕੀ ਆਪਸ਼ਨਾਂ ਵਿਚੋਂ ਉਸ ਲਈ ਕੋਈ ਦੇ ਕੋਰਸ ਪੜ੍ਹਨੇ ਲਾਜ਼ਮੀ ਹਨ-**
ਖੋਜ-ਵਿਧੀ ਅਧਿਐਨ (PBI-609)	ਪੰਜਾਬੀ ਭਾਸ਼ਾ, ਸਾਹਿਤ, ਲੋਕਧਾਰਾ ਅਤੇ ਸਭਿਆਚਾਰ ਦੇ ਵਿਭਿੰਨ ਖੇਤਰਾਂ ਵਿਚ ਖੋਜ ਕਰਨ ਦੇ ਢੰਗਾਂ ਅਤੇ ਵਿਧੀਆਂ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਦੇਣ ਦੇ ਨਾਲ-ਨਾਲ ਆਧੁਨਿਕ ਮੀਡੀਆ ਅਤੇ ਇੰਟਰਨੈੱਟ ਨਾਲ ਜੁੜੀ ਖੋਜ ਸਮੱਗਰੀ ਬਾਰੇ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨਾ।

ਸਾਹਿਤ ਇਤਿਹਾਸ ਅਤੇ ਪੰਜਾਬੀ ਸਾਹਿਤ ਦੀ ਇਤਿਹਾਸਕਾਰੀ (PBI-611)	ਪੰਜਾਬੀ ਸਾਹਿਤ ਦੀ ਮੁੱਢਲੀ ਇਤਿਹਾਸਕਾਰੀ ਤੋਂ ਲੈ ਕੇ ਆਧੁਨਿਕ ਸਮਕਾਲੀ ਪੰਜਾਬੀ ਸਾਹਿਤ ਬਾਰੇ ਜਾਣੂ ਹੋਣਾ , ਆਧੁਨਿਕ ਕਾਲ ਤੋਂ ਲੈ ਕੇ ਸਮਕਾਲੀ ਪੰਜਾਬੀ ਸਾਹਿਤ ਦੀ ਸੰਯੁਕਤ ਇਤਿਹਾਸਕਾਰੀ ਬਾਰੇ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨਾ
ਲੋਕਧਾਰਾ ਅਤੇ ਸਭਿਆਚਾਰ (PBI-612)	ਲੋਕਧਾਰਾ ਅਤੇ ਸਭਿਆਚਾਰ ਦੀ ਸਿਧਾਂਤਕ ਜਾਣਕਾਰੀ ਦੇ ਨਾਲ-ਨਾਲ ਬੁਨਿਆਦੀ ਸੰਕਲਪਾਂ ਨੂੰ ਸਮਝਣ ਉਪਰੰਤ ਪੰਜਾਬ ਅਤੇ ਹਿਮਾਚਲ ਦੀ ਲੋਕਧਾਰਾ ਅਤੇ ਸਭਿਆਚਾਰ ਦੇ ਤੁਲਨਾਤਮਕ ਅਧਿਐਨ ਸਬੰਧੀ ਸਮਰੱਥਾ ਪੈਦਾ ਕਰਨਾ
ਸਾਹਿਤ ਸਿਧਾਂਤ ਅਤੇ ਪੰਜਾਬੀ ਅਲੋਚਨਾ (PBI-613)	ਭਾਰਤੀ ਅਤੇ ਪੱਛਮੀ ਸਾਹਿਤ ਸਿਧਾਂਤਾਂ ਦੇ ਪ੍ਰਸੰਗ ਵਿਚ ਪੰਜਾਬੀ ਆਲੋਚਨਾ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ
ਪੰਜਾਬੀ ਸੂਫੀ ਕਾਵਿ ਧਾਰਾ (PBI-614)	ਪੰਜਾਬੀ ਸੂਫੀ ਕਵਿਤਾ ਦੇ ਇਤਿਹਾਸ ਦੇ ਹਵਾਲੇ ਨਾਲ ਬਾਬਾ ਫ਼ਰੀਦ, ਸ਼ਾਹ ਹੁਸੈਨ, ਬੁੱਲ੍ਹੇ ਸ਼ਾਹ ਅਤੇ ਸੁਲਤਾਨ ਬਾਹੂ ਦੇ ਕਲਾਮ ਦਾ ਵਿਸ਼ਾਗਤ ਅਤੇ ਕਲਾਤਮਕ ਅਧਿਐਨ ਕਰਨਾ
ਗੁਰਮਤਿ ਕਾਵਿ ਧਾਰਾ (PBI-615)	ਗੁਰਮਤਿ ਕਾਵਿ ਦੀ ਸਿਧਾਂਤਕ ਜਾਣਕਾਰੀ ਦੇਣ ਦੇ ਨਾਲ-ਨਾਲ ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਜੀ ਦੀਆਂ ਤਿੰਨ ਬਾਣੀਆਂ ਜਪੁਜੀ ਸਾਹਿਬ, ਆਸਾ ਦੀ ਵਾਰ ਅਤੇ ਬਾਰਾਂਮਾਹ ਤੁਖਾਰੀ ਦਾ ਅਧਿਐਨ ਕਰਨਾ। ਗੁਰਮਤਿ ਕਾਵਿ ਦੇ ਇਤਿਹਾਸਿਕ ਪਰਿਪੇਖ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨ ਦੇ ਨਾਲ-ਨਾਲ ਅਨੰਦ ਸਾਹਿਬ-ਗੁਰੂ ਅਮਰਦਾਸ, ਸਲੋਕ ਮਹਲਾ ਨੌਵਾਂ- ਗੁਰੂ ਤੇਗ ਬਹਾਦਰ ਜੀ ਅਤੇ ਭਾਈ ਗੁਰਦਾਸ ਦੀ ਪਹਿਲੀ ਵਾਰ ਦਾ ਅਧਿਐਨ ਕਰਨਾ। ਗੁਰਮਤਿ ਕਾਵਿ ਦੀਆਂ ਰੂਪਾਕਾਰਕ ਵੰਨਗੀਆਂ ਦੱਸਣ ਦੇ ਨਾਲ-ਨਾਲ ਸੁਖਮਨੀ ਸਾਹਿਬ-ਗੁਰੂ ਅਰਜਨ ਦੇਵ, ਬਾਰਾਂਮਾਹ ਮਾਝ-ਗੁਰੂ ਅਰਜਨ ਦੇਵ, ਜਾਪੁ ਸਾਹਿਬ-ਗੁਰੂ ਗੋਬਿੰਦ ਸਿੰਘ ਦਾ ਅਧਿਐਨ ਕਰਨਾ। ਗੁਰਮਤਿ ਕਾਵਿ ਦੀਆਂ ਪ੍ਰਵਿਰਤੀਆਂ ਬਾਰੇ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨ ਉਪਰੰਤ ਭਗਤ ਕਬੀਰ, ਭਗਤ ਨਾਮਦੇਵ ਅਤੇ ਭਗਤ ਰਵਿਦਾਸ ਦੀ ਬਾਣੀ ਦਾ ਅਧਿਐਨ ਕਰਨਾ
ਆਧੁਨਿਕ ਪੰਜਾਬੀ ਕਾਵਿ (PBI-616)	ਆਧੁਨਿਕ ਪੰਜਾਬੀ ਕਵਿਤਾ ਬਾਰੇ ਸਿਧਾਂਤਕ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨ ਦੇ ਨਾਲ-ਨਾਲ ਆਧੁਨਿਕ ਕਵਿਤਾ ਪ੍ਰਮੁੱਖ ਕਾਵਿ-ਧਾਰਾਵਾਂ ਜਿਵੇਂ ਰਹੱਸਵਾਦ, ਰੁਮਾਂਸਵਾਦ, ਪ੍ਰਗਤੀਵਾਦ, ਜੁਝਾਰਵਾਦ, ਪ੍ਰਯੋਗਵਾਦ, ਯਥਾਰਥਵਾਦ, ਆਧੁਨਿਕਤਾਵਾਦ ਅਤੇ ਉਤਰ-ਆਧੁਨਕਤਾਵਾਦ ਬਾਇਰੇ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨਾ। ਭਾਈ ਵੀਰ ਸਿੰਘ ਤੋਂ ਲੈ ਕੇ ਸਮਕਾਲੀ ਪੰਜਾਬੀ ਕਵਿਤਾ ਦੇ ਪ੍ਰਮੁੱਖ ਕਵੀਆਂ ਦੀ ਕਵਿਤਾ ਅਤੇ ਉਹਨਾਂ ਦੀ ਵਿਚਾਰਧਾਰਾ ਬਾਰੇ ਸਮਝ ਹਾਸਿਲ ਕਰਨੀ।

ਪੰਜਾਬੀ ਗਲਪ (PBI-617)	ਆਧੁਨਿਕ ਪੰਜਾਬੀ ਕਹਾਣੀ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨ ਦੇ ਨਾਲ-ਨਾਲ ਪ੍ਰਮੁੱਖ ਪੰਜਾਬੀ ਕਹਾਣੀਕਾਰਾਂ ਅਤੇ ਉਹਨਾਂ ਦੀ ਕਹਾਣੀ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨਾ। ਪੰਜਾਬੀ ਨਾਵਲ ਦੇ ਸਿਧਾਂਤ , ਇਤਿਹਾਸ ਅਤੇ ਪ੍ਰਵਿਰਤੀਆਂ ਬਾਰੇ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨ ਉਪਰੰਤ ਪ੍ਰਮੁੱਖ ਪੰਜਾਬੀ ਨਾਵਲਕਾਰਾਂ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ।
ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਅਤੇ ਗੁਰਮੁਖੀ ਲਿੱਪੀ (PBI-618)	ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਅਤੇ ਭਾਸ਼ਾ ਵਿਗਿਆਨ ਦੇ ਸੰਕਲਪਾਂ ਅਤੇ ਵਿਧੀਆਂ ਨੂੰ ਸਮਝਦਿਆਂ ਹੋਇਆ ਪੂਰਬੀ ਅਤੇ ਪੱਛਮੀ ਸੰਕਲਪਾਂ ਸਬੰਧੀ ਸਮਝ ਪੈਦਾ ਕਰਨੀ। ਗੁਰਮੁਖੀ ਲਿੱਪੀ ਦੇ ਜਨਮ, ਵਿਕਾਸ ਅਤੇ ਸਮਕਾਲੀ ਹਾਲਤਾਂ ਬਾਰੇ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ।

BSc (Hons) Psychology

Programme Outcome

- To familiarize students to the field of psychology, give them the necessary exposure to develop interest in the field and thus prepare them for post-graduate programme in psychology.
- Appreciate the different branches and emerging fields of psychology
- To understand the fundamental processes underlying human behavior and the process of human development and change from biological and psychosocial perspective.
- To understand the different aspects of human behavior in the social, cultural and organizational/work context and thus understanding the effects of group membership on individual behavior.
- To understand abnormal behavior and the various components that promotes health and well being through papers such and Health psychology and Positive Psychology.
- To introduce students to the basic aspects in experimentation and testing in psychology so that students are able to conduct simple tests and experiments, write brief reports based on the findings from the tests and experiments
- To familiarize students with basic statistical techniques and fundamentals of research methodology. In addition, students are trained for the application of the same by engaging them in simple quantitative research in small groups.

Programme Specific Outcome

- Students will be able to distinguish between different fields of psychology
- Students will be able to identify the causes behind a behavior in different developmental stages.
- Students will be able to understand behavioral diversity in the context of society, culture and organization.
- Students will be able to explain the causes behind abnormal behavior and will be able to understand therapeutic importance for mental illness with help of principles and theories of health and positive psychology.
- Students will be able to understand the concept of cause and effect relationship behind behavioral outcome with the help of research methodology, experimentation and statistical techniques

COURSE OUTCOME

Semester	Course code	Course name	L	T	P	C
I	**PSYH 101**	**General Psychology-I**	5	0	0	5

Course Objectives and Learning Outcome: After the completion of this course students will be able:

- Understanding and application of psychological principles, theories and methods of different psychological areas (like learning, memory, etc.) to understand the complexity of human behavior.
- Knowledge of the fundamental physiological functional mechanism behind the Nervous system in the human body.

- It also correlates to the understanding of historical context of different studies and researches.

PSYH 102	General Psychology-II	4	0	0	4

Course Objectives and Learning Outcome: After the completion of this course students will be able:

- Extensive knowledge about different theories and principles of Cognition and Behaviour concerning the areas of Motivation, Emotion, Intelligence, Thinking, and Personality etc.
- Understand the measures involved in different aspects of human behaviour.
- Develop ability to relate the psychological concepts to everyday life events

ENG-102	Communication Skills	2	0	1	3

- To stimulate intellectual exercise and to develop communication skills.
- It aims imparting students spectrum of ideas and values emphasizing on their contemporary relevance.
- To guide them in becoming socially responsible citizen and balanced human beings.
- To help students in increasing their confidence in Public speaking.
- To teach them interpersonal skills as: teamwork, negotiation, motivation and self-reflection.

PBI-114	Punjabi Lazmi-I	3	0	0	3

- ਪੁਸਤਕ ਕਾਵਿ-ਧਾਰਾ ਦੇ ਹਵਾਲੇ ਨਾਲ ਭਾਈ ਵੀਰ ਸਿੰਘ, ਧਨੀ ਰਾਮ ਚਾਤ੍ਰਿਕ, ਪੂਰਨ ਸਿੰਘ, ਮੋਹਨ ਸਿੰਘ, ਬਾਵਾ ਬਲਵੰਤ, ਪ੍ਰੀਤਮ ਸਿੰਘ ਸਫ਼ੀਰ, ਅੰਮ੍ਰਿਤਾ ਪ੍ਰੀਤਮ, ਹਰਿਭਜਨ ਸਿੰਘ, ਸ਼ਿਵ ਕੁਮਾਰ ਬਟਾਲਵੀ ਦੀ ਕਵਿਤਾ ਦੇ ਹਾਵਲੇ ਨਾਲ ਆਧੁਨਿਕ ਪੰਜਾਬੀ ਕਵਿਤਾ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ।
- ਪੁਸਤਕ ਕਥਾ-ਰੰਗ ਦੇ ਹਵਾਲੇ ਨਾਲ ਅੱਠ ਕਹਾਣੀਆਂ (ਸਤਾਈ ਜਨਵਰੀ, ਮੁੜ ਵਿਧਵਾ, ਪਠਾਣ ਦੀ ਧੀ, ਤ੍ਰਿਸ਼ਨਾ, ਭੇਤ ਵਾਲੀ ਗੱਲ, ਧਰਤੀ ਹੇਠਲਾ ਬੌਲਦ, ਇਕ ਬਾਲੜੀ ਦੋ ਪਤਾਸੇ, ਮੋਹੜੀ) ਦੇ ਸੰਦਰਭ
- ਭਾਸ਼ਾ: ਪਰਿਭਾਸ਼ਾ ਅਤੇ ਵਿਸ਼ੇਸ਼ਤਾਵਾਂ, ਭਾਸ਼ਾ ਵੰਨਗੀਆਂ, ਉਪਭਾਸ਼ਾ: ਪਰਿਭਾਸ਼ਾ ਅਤੇ ਵਿਸ਼ੇਸ਼ਤਾਵਾਂ, ਭਾਸ਼ਾ ਤੇ ਉਪਭਾਸ਼ਾ ਦਾ ਅੰਤਰ-ਸੰਬੰਧ, ਪੰਜਾਬੀ ਦੀਆਂ ਉਪਭਾਸ਼ਾਈ ਵੰਨਗੀਆਂ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ।
- ਸ਼ਬਦ ਸ਼੍ਰੇਣੀਆਂ : ਨਾਂਵ, ਪੜਨਾਂਵ, ਵਿਸ਼ੇਸ਼ਣ, ਕਿਰਿਆ, ਕਿਰਿਆ-ਵਿਸ਼ੇਸ਼ਣ, ਸਬੰਧਕ, ਯੋਜਕ, ਵਿਸਮਿਕ ਸਬੰਧੀ ਸਿਧਾਂਤਕ ਅਤੇ ਵਿਹਾਰਿਕ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ।

ENG-101	Compulsory English	3	0	0	3

- To Understand the correct application of the subject .
- To enrich their vocabulary
- To Develop beginning vocabulary and aesthetic sense both
- Learn to make coherent sentences and propound coherent ideas
- Close Reading and critical analysis of the Text

EDU-101	Human Values and Ethics	2	0	0	2

- Understanding the need, basic guidelines, content and process of value education, self-exploration, continuous happiness and prosperity, fulfillment of basic aspirations of human being.

- To learn importance of universal human values and ethical human conduct, basis for holistic alternative towards universal human order
- To learn about Professional ethics and issues in professional ethics.

COMP-101	**Introduction to Computer Applications**	**2**	**0**	**1**	**3**

- To know basic applications of computers in different organizations.
- Understanding, types of Computer systems like Micro, Mini, Mainframe and Super Computers.
- To know about input and output devices, Data Processing and storage.

II	**PSYH 121**	**General Psychology-III**	**4**	**0**	**0**	**4**

Course Objectives and Learning Outcome: After the completion of this course students will be able

- To introduce and initiate the student into the world of Psychology with a brief historical sketch of the science of psychology and a glimpse into the methods used in the study of human behaviour.
- To understand the fundamental processes underlying human behavior such as biological foundations of behaviour, processes underlying sensation, perception, cognition, memory, learning, motivation, emotion, individual differences, intelligence, personality and states of consciousness.
- To apply the principles of psychology in day-to-day life for a better understanding of themselves and others.
- 4.To understand further the fundamental processes underlying human behavior such as learning, motivation, emotion, individual differences, intelligence, personality and states of consciousness.

PSYH 122	**Educational Psychology**	**3**	**0**	**0**	**3**

Course Objectives and Learning Outcome: At the end of this course students will be able

- Understand how psychological theories and principles relate to everyday life and apply knowledge of Behaviour modification and life skill training to solve everyday problems.
- Students are exposed to the elementary scientific research methods, techniques, counselling skills, ethics and evaluating skills of Psychology in educational settings.
- Apply psychological principles to understand personal as well as social issues and problems.
- Apply the principles of psychology in day-to-day life for a better understanding of themselves and others.

STAT-102	**Statistics**	**3**	**0**	**0**	**3**

Course Objectives and Learning Outcome: At the end of this course students will be able

- Understand the basic concept of statistics in psychology.
- Explore and get introduced to the various statistical tools (parametric and non-parametric) used for analysis.

- Learn categorization and presentation of data; graphical representation used to communicate data
- Knowledge about hypothesis testing
- Execute qualitative and quantitative data analysis

ENG-122	Business Communication Skills	2	0	1	3

- To provide students fair knowledge of English and make them able to handle the future jobs in industry.
- To help the students in acquiring proficiency, both in spoken and written language.
- To develop their vocabulary and comprehension skills.
- To improve their grammar and enhance writing skills.
- To assist students in developing formal and informal communication skills.

PBI-124	Punjabi Lazmi-2	3	0	0	3

- ਪੁਸਤਕ ਕਾਵਿ-ਧਾਰਾ ਦੇ ਹਵਾਲੇ ਨਾਲ ਸ.ਸ. ਮੀਸ਼ਾ, ਜਸਬੀਰ ਸਿੰਘ ਆਹਲੂਵਾਲੀਆ, ਰਵਿੰਦਰ ਰਵੀ, ਜਗਤਾਰ, ਸੁਰਜੀਤ ਪਾਤਰ, ਪਾਸ਼, ਹਰਿਭਜਨ ਹਲਵਾਰਵੀ, ਮਨਜੀਤ ਟਿਵਾਣਾ ਦੀ ਕਵਿਤਾ ਦੇ ਹਾਵਲੇ ਨਾਲ ਆਧੁਨਿਕ ਪੰਜਾਬੀ ਕਵਿਤਾ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ।
- ਪੁਸਤਕ ਕਥਾ-ਰੰਗ ਦੇ ਹਵਾਲੇ ਨਾਲ ਅੱਠ ਕਹਾਣੀਆਂ (ਸ਼ਹੀਦ, ਜਿਊਣ ਜੋਗੇ, ਮੂਨ ਦੀ ਅੱਖ, ਇੱਕੀਵੀਂ ਸਦੀ, ਬਠਲੂ ਚਮਿਆਰ, ਜਿੱਥੋਂ ਸੂਰਜ ਉੱਗਦਾ ਹੈ, ਡੂੰਮ) ਦੇ ਸੰਦਰਭ ਵਿਚ ਪੰਜਾਬੀ ਕਹਾਣੀ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ।
- ਗੁਰਮੁਖੀ ਲਿਪੀ: ਜਨਮ ਅਤੇ ਵਿਕਾਸ, ਗੁਰਮੁਖੀ ਲਿਪੀ ਦੀਆਂ ਵਿਸ਼ੇਸ਼ਤਾਵਾਂ, ਗੁਰਮੁਖੀ ਲਿਪੀ ਦਾ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਨਾਲ ਸੰਬੰਧ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ।
- ਵਿਆਕਰਨਿਕ ਸ਼੍ਰੇਣੀਆਂ: ਲੋੜ, ਮਹੱਤਵ ਅਤੇ ਮੁੱਖ ਸੰਕਲਪ - ਵਚਨ, ਲਿੰਗ, ਪੁਰਖ, ਕਾਲ, ਕਾਰਕ ਸਬੰਧੀ ਸਿਧਾਂਤਕ ਅਤੇ ਵਿਹਾਰਿਕ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ।

ENG-121	Compulsory English	3	0	0	3

- To enhance the critical thinking of the students with the help of poetry and essays.
- To read and appreciate the beauty of stories on their own.
- To teach them the intricacies of grammar so that they can make sentences on their own without any grammatical errors.
- Enable them to understand the difference between formal and informal communication with the help of letter writing.
- To enlighten and aware students about the literary characteristics of various poetic forms.

EVS-301	Environmental Science	3	0	0	3

- To understand the need for public awareness for environment.
- To learn about renewable and non-renewable resources, problems associated with Natural resources.

- To know about ecosystems, structure and function of an ecosystem.
- Understand biodiversity and impact on environment, conservations of bio resources.
- Environmental pollution and causes and remedies.

III	**PSYH 201**	**Psychological Testing**	**4**	**0**	**0**	**4**

Course Objectives and Learning Outcome: At the end of this course students will be able

- Analyze and apply the understanding of psychological testing.
- Interpret and assess the role of psychological testing in various settings.
- Effectively synthesize and apply the variations in scales and tests.
- Recognize the various types of psychological tests
- Organize the various steps in construction of a psychological test
- Review the ethical issues surrounding psychometric evaluation, testing and interpretation in day to day life

PSYH 202	**Experimental Psychology-Practical- 1**	**0**	**1**	**2**	**3**

Course Objectives and Learning Outcome: At the end of this course students will be able

- Review the concepts of psychology through the mediums of the experiments.
- Understand the rationale, strengths and limitations of the experimental method of gaining knowledge about mental and behavioural processes.
- Develop skills of conducting and documenting experiments in the field of psychology.
- Learn how to design experimental and non-experimental studies.
- To enhance the scientific temper of the students by providing them with the experimental knowledge of psychology**.**

PSYH 203	**Sports Psychology**	**4**	**0**	**0**	**4**

Course Objectives and Learning Outcome: At the end of this course students will be able

- Understand how psychological theories and principles relate to sports psychology and applied Knowledge of Behaviour modification and life skill training in field of supports.
- Students are exposed to basic scientific research methods, techniques, counselling skills, ethics and evaluate skills of sports Psychology.
- Apply psychological principles to personal and social issues and problems

ENG- 202	**Fundamental Communication Skills**	**2**	**0**	**1**	**3**

- To enable all students to develop positive self –concepts.
- To enhance their skills in communicating competently in groups and organizations.
- To aware students with the major practices in effective public speaking.
- To develop professional skills that prepare them for immediate employment and life- long learning advanced areas of job field.
- To developing an understanding of the various writing tasks for specific audience and purpose.

PBI- 214	Punjabi Lazmi-3	3	0	0	3

- ਪਾਠ-ਪੁਸਤਕ - ਪੰਜਾਬੀ ਕਾਵਿ ਸੰਗ੍ਰਿਹ (1700 ਈ. ਤੱਕ) ਵਿਚੋਂ ਗੁਰਮਤਿ ਕਾਵਿ (ਭਗਤ ਬਾਣੀ+ਗੁਰੂ ਸਾਹਿਬਾਨਾਂ ਦੀ ਬਾਣੀ) ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ।
- ਇੱਕ ਐਤਵਾਰ, ਜੁੱਤੀਆਂ ਦਾ ਜੋੜਾ, ਨਵਾਂ ਚਾਨਣ, ਡਾਕਟਰ ਪਲਟਾ) ਦੇ ਹਵਾਲੇ ਨਾਲ ਪੰਜਾਬੀ ਨਾਟਕ ਅਤੇ ਇਕਾਂਗੀ ਸਬੰਧੀ ਸੂਝ ਪੈਦਾ ਕਰਨੀ।
- ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਦਾ ਜਨਮ ਅਤੇ ਵਿਕਾਸ, ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਦੀ ਵਰਤਮਾਨ ਹਾਲਤ (ਸਾਹਿਤ, ਮੀਡੀਆ ਅਤੇ ਵਿੱਦਿਅਕ ਅਦਾਰਿਆਂ ਦੇ ਪ੍ਰਸੰਗ ਵਿਚ)
- ਧੁਨੀ ਵਿਗਿਆਨ ਅਤੇ ਧੁਨੀ ਵਿਉਂਤ : ਪਰਿਭਾਸ਼ਾ, ਵਰਗੀਕਰਨ ਅਤੇ ਅੰਤਰ-ਨਿਖੇੜ। ਧੁਨੀਆਂ ਦਾ ਵਰਗੀਕਰਨ : ਖੰਡੀ ਅਤੇ ਅਖੰਡੀ ਧੁਨੀਆਂ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ।
- ਦਫ਼ਤਰੀ ਚਿੱਠੀ-ਪੱਤਰ ਲੇਖਣ ਦਾ ਅਭਿਆਸ ਕਰਵਾਉਣਾ।

ENG-201	Compulsory English	3	0	0	3

- To trace the development history of English Literature.
- To interpret the text from contemporary point of view.
- To critically analysis these text as a source of wisdom.
- To provide them knowledge of English Grammar as, types of clause, translation, complex and compound sentences.
- To develop critical thinking and imagination through long and short stories, poems and drama.

IV	PSYH 221	Recent Perspectives of Psychology	4	0	0	4

Course Objectives and Learning Outcome: At the end of this course students will be able

- Understand basic concepts of recent psychology and its relationship to other branches of psychology
- Gain fundamental understanding of well-being and happiness in the context of positive psychology
- Grasp basic cognitive states and processes in recent psychology
- Transfer the theoretical concepts into practical setting
- Develop an awareness of applications and implications of positive psychology concepts and theories
- Equip himself /herself with the skill and competence to apply positive psychology principles in a range of environments to increase individual and collective wellbeing

PSYH 222	Social Psychology	4	0	0	4

Course Objectives and Learning Outcome: After the completion of this course, a student will be able to:

- Understand the historical and scientific origin and development of the field in the western and Indian context.
- Describe the development of the self and the dynamics of interpersonal attraction, prosocial behaviour, aggression, prejudice, group processes and attitude formation and change in a social context.
- Comprehend the nature of scientific methods employed to study behaviour in the social context.

PSYH 223	Experimental Psychology-Practical II	0	1	2	3

Course Objectives and Learning Outcomes At the end of the course, students will be able to

- Learn, review, understand and to apply of the concepts of psychology through the medium of the experiments
- Develop the skills of conducting and documenting experiments in the field of psychology.
- Knowledge about the experiments that lead towards the development of the field of psychology and explanation of the contributions of various thinkers in the field.
- Conduct experiments and administer psychological scales to a subject
- Make interpretations and draw conclusions based on the norms given in the manual
- Write a report which reflects the details of the experiment/ test, the aim, applications, procedure of administration and subject results
- Using simple statistical techniques for carrying out group based small quantitative research projects.

ENG-222	Professional Writing & Communication Skills	2	0	1	3

- Offers an opportunity to learn and apply principles of interpersonal communication in daily life.
- Emphasis on psychological, social, cultural and linguistic factors, which affect communication.
- It helps students to improve their communication skills in personal as well as in professional spheres.
- Enable students to make use of various kinds of non-verbal communication and to understand symbols.
- Improve their listening as well as speaking skills.

PBI-224	Punjabi Lazmi-4	3	0	0	3

- ਪਾਠ-ਪੁਸਤਕ - ਪੰਜਾਬੀ ਕਾਵਿ ਸੰਗ੍ਰਿਹ (1700 ਈ. ਤੱਕ) ਵਿਚੋਂ ਸੂਫ਼ੀ ਕਾਵਿ ਅਤੇ ਕਿੱਸਾ ਕਾਵਿ (ਸ਼ਾਹ ਹੁਸੈਨ ਦੀਆਂ ਕਾਫ਼ੀਆਂ+ਹੀਰ ਦਮੋਦਰ) ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ।
- ਪਾਠ-ਪੁਸਤਕ - ਮੰਚ ਦਰਸ਼ਨ ਵਿਚੋਂ ਅਗਲੀਆਂ ਪੰਜ ਇਕਾਂਗੀਆਂ (ਗਊਮੁਖਾ-ਸ਼ੇਰਮੁਖਾ, ਜ਼ੈਲਦਾਰ, ਇਕ ਵਿਚਾਰੀ ਮਾਂ, ਅੰਨ੍ਹੇ ਨਿਸ਼ਾਨਚੀ, ਚਾਬੀਆਂ) ਦੇ ਆਧਾਰ 'ਤੇ ਪੰਜਾਬੀ ਇਕਾਂਗੀ ਬਾਰੇ ਸਮਝ-ਸੂਝ ਪੈਦਾ ਕਰਨੀ।

- ਸ਼ਬਦ ਵਿਗਿਆਨ : ਪਰਿਭਾਸ਼ਾ, ਬਣਤਰ ਅਤੇ ਰਚਨਾ; ਪੰਜਾਬੀ ਭਾਵੰਸ਼ ਵਿਉਂਤ : ਪਰਿਭਾਸ਼ਾ ਅਤੇ ਵਰਗੀਕਰਨ।
- ਪੰਜਾਬੀ ਸ਼ਬਦ ਜੋੜਾਂ ਦੇ ਨਿਯਮ ਅਤੇ ਸਮੱਸਿਆਵਾਂ।
- ਇਸ਼ਿਤਿਹਾਰ, ਪ੍ਰੈੱਸ ਨੋਟ ਅਤੇ ਖ਼ਬਰਾਂ : ਲਿਖਣ ਦੀਆਂ ਵਿਧੀਆਂ ਅਤੇ ਨੇਮਾਂ ਬਾਰੇ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ।

ENG-221	**Compulsory English**	**3**	**0**	**0**	**3**

- To equip them to attempt practical criticism of plays, passages and poems
  To read and appreciate stories on their own.
- To develop a comparative perspective to study the texts
- To recognise and discuss the aspects of an author.

V	**PSYH 301**	**Organizational Psychology**	**4**	**0**	**0**	**4**

Course Objectives and Learning Outcomes: After completing the course the students will be able to:

- Demonstrate fundamental knowledge about need and scope of I/O Psychology
- Be aware of the brief history and various related fields of I/O Psychology
- Learn about employee motivation, job satisfaction and leadership styles.
- Understand the concept of organizational culture and learn the various types and functions of organizational culture
- Comprehend the concept of Job analysis and be aware about the various methods of Job analysis.
- Learn about the process of employee selection and understand the various methods of selection process with special emphasis on psychological testing.
- Demonstrate knowledge about the processes of training and performance appraisal
- Understand the meaning of consumer behaviour and the decision making process of the consumer.

PSYH 302	**Abnormal Psychology-I**	**4**	**0**	**0**	**4**

Course Objective and Learning Outcome: At the completion of the course students will be able:

- To have knowledge of different aspects of abnormal behaviour.
- To know the historical development of the study of abnormal behaviour, criteria and perspectives in abnormal behaviour, common classification systems, and range of disorders including anxiety disorders, mood disorders, schizophrenia, disorders generally observed at childhood and adolescence, and personality disorders.
- Understand various behavioural dysfunctions and use the same in day-to-day life.

PSYH 303	**Child and Adolescent Development**	**4**	**0**	**0**	**4**

Course Objectives and Learning Outcomes: At the end of the course, students will be able to:

- Understand basic concepts, issues and debates in the field of developmental psychology.
- Appreciate principal theories of lifespan development.
- Comprehend human development as progressing through different stages.

- Discuss development from the perspective of different domains such as physical, motor, cognitive, and psychosocial.
- Understand the role of family, peers and community in influencing development at different stages.

ENG-302	English for Technical Communication	2	0	1	3

- To enhance their language skills for greater accuracy and precision
- Learn how to persuade the audience
- Deliver presentations and receive constructive feedback
- Active Participation in Discussion and Debates
- Produce technical documentation with accuracy and detail
- To enhance the Writing Skills using professional tools

PBI-314	Punjabi Lazmi-5	3	0	0	3

- ਨਾਵਲ : ਸੁੰਦਰੀ (ਭਾਈ ਵੀਰ ਸਿੰਘ) ਦਾ ਪਾਠਗਤ ਅਤੇ ਵਿਸ਼ਾਗਤ ਅਧਿਐਨ ਕਰਵਾਉਣਾ।
- ਪਾਠ-ਪੁਸਤਕ - ਵਾਤਾਵਰਨ ਚੇਤਨਾ ਵਿਚਲੇ ਲੇਖਾਂ ਦੇ ਆਧਾਰ ‘’ਤੇ ਵਿਦਿਆਰਥੀਆਂ ਵਿਚ ਵਾਤਾਵਰਨ ਚੇਤਨਾ ਪੈਦਾ ਕਰਨੀ।
- ਵਾਕ-ਵਿਉਂਤ: ਪਰਿਭਾਸ਼ਾ ਅਤੇ ਵਰਗੀਕਰਨ; ਰੂਪ ਦੇ ਆਧਾਰ ‘ਤੇ ਵਾਕ ਵੰਡ- ਸਧਾਰਨ, ਸੰਯੁਕਤ, ਮਿਸ਼ਰਤ। ਕਾਰਜ ਦੇ ਅਧਾਰ ਤੇ ਵਾਕ ਵੰਡ- ਬਿਆਨੀਆ, ਸਵਾਲੀਆ ਅਤੇ ਹੁਕਮੀ ਵਾਕ।
- ਸੰਚਾਰ: ਪਰਿਭਾਸ਼ਾ ਅਤੇ ਵਰਗੀਕਰਨ, ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਦੇ ਸੰਚਾਰ ਸਾਧਨ: ਪ੍ਰਿੰਟ ਅਤੇ ਬਿਜਲਈ ਮੀਡੀਆ (ਅਖ਼ਬਾਰ, ਰਸਾਲੇ, ਰੇਡੀਓ, ਟੈਲੀਵਿਜਨ, ਕੰਪਿਊਟਰ ਅਤੇ ਇੰਟਰਨੈੱਟ ਦਾ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਲਈ ਯੋਗਦਾਨ)
- ਕਿਸੇ ਅਣਡਿੱਠੇ ਪੈਰੇ ਦਾ ਢੁੱਕਵਾਂ ਸਿਰਲੇਖ ਅਤੇ ਸੰਖੇਪ-ਰਚਨਾ ਅਭਿਆਸ ਕਰਵਾਉਣਾ।

ENG- 301	Compulsory English	3	0	0	3

- Enable students to understand various kinds of business communication tactics and to use them in professional sphere.
- Make students able to read and understand poetry by enhancing their critical ability.
- Make them able to inculcate habits of pleasurable reading with the help of novel reading.
- To learn to use grammar correctly.

VI	PSYH 321	Abnormal Psychology-II	4	0	0	4

Course Objectives and Learning Outcomes: At the end of the course, students will be able to:

- To have knowledge of different aspects of abnormal behaviour.
- To know the historical development of the study of abnormal behaviour, criteria and perspectives in abnormal behaviour, common classification systems, and range of disorders including anxiety disorders, mood disorders, schizophrenia, disorders generally observed at childhood and adolescence, and personality disorders.
- Understand various behavioural dysfunctions and use the same in day-to-day life.

PSYH 322	Counselling Psychology	4	0	0	4

Course Objectives and Learning Outcomes: At the end of the course, students will be able to:

- Apply and develop conceptual difference between guidance counseling & psychotherapy.
- Develop technique and implication of applied counseling skills in areas of practice.
- Evaluate counseling theories & their application to the outside world.

Classify the role and responsibilities of a professional counsellor

Student will be able to:

- Evaluate various psychotherapies and schools in counselling techniques.
- Develop skills of eclectic therapeutic plans.
- Identify the techniques to practice in the therapy encounter and how those techniques should be implemented with a variety of disorders and psychosocial issues

PSYH-323	Project Work	0	0	4	4

Course Objectives and Learning Outcomes: Students will be able to:

- Understand the concept of project work and research
- Develop the research aptitude
- Learn the practical aspect of psychological theories by field investigation and case studies

ENG-322	Technical Communication- Principles and Practices	0	0	4	4

- To enhance their language skills for greater accuracy and precision
- Learn how to persuade the audience
- Deliver presentations and receive constructive feedback
- Active Participation in Discussion and Debates
- Produce technical documentation with accuracy and detail

PBI-324	Punjabi Lazmi-6	3	0	0	3

- ਪਾਠ-ਪੁਸਤਕ - ਯਾਦਾਂ ਦੀ ਕੰਨੀ ਦੇ ਆਧਾਰ 'ਤੇ ਵਾਰਤਕ ਸਬੰਧੀ ਸਮਝ-ਸੂਝ ਪੈਦਾ ਕਰਨੀ।
- ਪਾਠ-ਪੁਸਤਕ - ਵਾਰਤਕ ਵਿਵੇਕ ਦੇ ਆਧਾਰ 'ਤੇ ਆਧੁਨਿਕ ਵਾਰਤਕ ਦੇ ਵਿਸ਼ਾ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ।
- ਭਾਸ਼ਾ-ਵਿਗਿਆਨਕ ਸ਼ਬਦਾਵਲੀ: ਦੁਭਾਸ਼ਾਵਾਦ, ਬਹੁਭਾਸ਼ਾਵਾਦ, ਮਾਂ-ਬੋਲੀ, ਦੂਜੀ ਭਾਸ਼ਾ, ਸਰਕਾਰੀ ਭਾਸ਼ਾ।
- ਅਰਥ-ਵਿਗਿਆਨ: ਪਰਿਭਾਸ਼ਾ ਅਤੇ ਲੋੜ, ਅਰਥ ਵਿਸਤਾਰ ਅਤੇ ਸੰਕੋਚ, ਅਰਥ ਉਤਰਾਅ ਅਤੇ ਚੜ੍ਹਾਅ
- ਪੈਰਾ ਅਨੁਵਾਦ : ਅੰਗਰੇਜ਼ੀ ਤੋਂ ਪੰਜਾਬੀ (ਪੈਰਾ ਲਗਭਗ 100-125 ਸ਼ਬਦਾਂ ਦਾ ਹੋਵੇ)ਅਭਿਆਸ ਕਰਵਾਉਣਾ।

ENG- 321	Compulsory English	3	0	0	3

- To explore different genres and inculcate critical powers by looking at their meticulous details.
- To analyze various types of genres ranging from poetry to drama with reference to thematic and other approaches.
- Enable students to have a peep into the phonetic system of English language by using intonation and stress pattern.

- To teach syllable structure and syllable division by focusing on mono and disyllabic words.
- To teach them to use grammar correctly.

B.A. (Hons.) Gurmat Sangeet

PROGRAMME OUTCOMES , PROGRAMME SPECIFIC OUTCOMES, COURSE OUTCOMES

B.A (Hons)) Music-Programme Outcome	1. To be able to develop performing skills for practical presentation of Gurmat Sangeet tradition. 2. To be able to secure employment as Music teacher at PGT & TGT level in the discipline. 3. To be able to work as Tutor of Kirtan and also can develop entrepreneurship by establishing self owned institute. 4. The student will be able to develop performing skills thereby enhancing career opportunities through social media like You tube, Facebook & Instgram etc.
Programme Specific Outcome	1. Students will be able to Perform the various practical aspects like Gayan shellies, folk styles and light composition of Gurmat Sangeet Tradiition. 2. Being able to perform in Various taals. 3. Being aware of the in depth knowledge of theoretical aspects of the discipline. 4. being able to learn the skill of self-composition and develop creativity in the discipline as per the present day requirements. 5. being able to develop fluency in playing music instrument.
Course: B.A (Hons.) Music	**Outcomes**
Semester – 1	
Gurmat Sangeet (Major) (Theory) -1 (MGS-101)	1. Acquire the knowledge of technical terminology of the discipline.

	2. Acquire the knowledge of origin and development of Gurmat sangeet. 3. Enable students to write and read music from the traditional notation system.
Gurmat Sangeet (Major) (Practical) - 1 (MGS-102)	1. The student will be able to achieve dexterity of the voice. 2. Student will be able to learnt the grammatical and practical aspects of prescribed ragas in taals. 3. Student will be able to perform the kirtan of Asa di waar with use of different taals and tunes. 4. Student will be able to develop playing technique of Harmonium with proficiency.
Tabla (Minor-1) MTB - 103	1. Knowledge of varn of tabla. 2. Define the music term, Theka, Taal, Taali, Khaali, Vibhag. 3. Knowledge of origin of Tabla. 4. Teentaal, KahrvataalThah and Dugun. 5. Dadra, Rupak Theka Prakaar. Knowledge of Bhatkhande Taal Notation system
Compulsory English Eng -101	1. To Understand the correct application of the subject. 2. To enrich their vocabulary 3. To Develop beginning vocabulary and aesthetic sense both 4. Learn to make coherent sentences and propound coherent ideas 5. Close Reading and critical analysis of the Text
Lazmi Punjabi Pbi- 114	1. ਪੁਸਤਕ ਕਾਵਿ-ਧਾਰਾ ਦੇ ਹਵਾਲੇ ਨਾਲ ਭਾਈ ਵੀਰ ਸਿੰਘ, ਧਨੀ ਰਾਮ ਚਾਤ੍ਰਿਕ, ਪੂਰਨ ਸਿੰਘ, ਮੋਹਨ ਸਿੰਘ, ਬਾਵਾ ਬਲਵੰਤ, ਪ੍ਰੀਤਮ ਸਿੰਘ ਸਫ਼ੀਰ, ਅੰਮ੍ਰਿਤਾ ਪ੍ਰੀਤਮ, ਹਰਿਭਜਨ ਸਿੰਘ, ਸ਼ਿਵ ਕੁਮਾਰ ਬਟਾਲਵੀ ਦੀ ਕਵਿਤਾ ਦੇ ਹਾਵਲੇ ਨਾਲ ਆਧੁਨਿਕ ਪੰਜਾਬੀ ਕਵਿਤਾ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ। 2. ਪੁਸਤਕ ਕਥਾ-ਰੰਗ ਦੇ ਹਵਾਲੇ ਨਾਲ ਅੱਠ ਕਹਾਣੀਆਂ (ਸਤਾਈ ਜਨਵਰੀ, ਮੁੜ ਵਿਧਵਾ, ਪਠਾਣ ਦੀ ਧੀ, ਤ੍ਰਿਸ਼ਨਾ, ਭੇਤ ਵਾਲੀ ਗੱਲ, ਧਰਤੀ ਹੇਠਲਾ ਬੌਲਦ, ਇਕ ਬਾਲੜੀ ਦੋ ਪਤਾਸੇ, ਮੋਹੜੀ) ਦੇ ਸੰਦਰਭ

	3. ਭਾਸ਼ਾ: ਪਰਿਭਾਸ਼ਾ ਅਤੇ ਵਿਸ਼ੇਸ਼ਤਾਵਾਂ, ਭਾਸ਼ਾ ਵੰਨਗੀਆਂ, ਉਪਭਾਸ਼ਾ: ਪਰਿਭਾਸ਼ਾ ਅਤੇ ਵਿਸ਼ੇਸ਼ਤਾਵਾਂ, ਭਾਸ਼ਾ ਤੇ ਉਪਭਾਸ਼ਾ ਦਾ ਅੰਤਰ-ਸੰਬੰਧ, ਪੰਜਾਬੀ ਦੀਆਂ ਉਪਭਾਸ਼ਾਈ ਵੰਨਗੀਆਂ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ। 4. ਸ਼ਬਦ ਸ਼੍ਰੇਣੀਆਂ : ਨਾਂਵ, ਪੜਨਾਂਵ, ਵਿਸ਼ੇਸ਼ਣ, ਕਿਰਿਆ, ਕਿਰਿਆ-ਵਿਸ਼ੇਸ਼ਣ, ਸਬੰਧਕ, ਯੋਜਕ, ਵਿਸਮਿਕ ਸਬੰਧੀ ਸਿਧਾਂਤਕ ਅਤੇ ਵਿਹਾਰਿਕ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ।
Semester - 2	
Gurmat Sangeet (Major) (Theory) -2 (MGS-121)	1. Acquire the knowledge of technical terminology of Gurmat sangeet. 2. Acquire the knowledge of ancient concepts of music viz Nibadh and Anibadh gaan and Alaaps – Taans. 3. Acquire the Detailed knowledge shri guru granth sahib ji. 4. Being aware of contribution of shri guru nanak dev ji 5. Being Aware of the description and identification of ragas from given swar patterns.
Gurmat Sangeet (Major) (Practical) -2 (MGS-122)	1. Student will be able to learn the grammatical and practical aspects of prescribed ragas in taals. 2. Student will be able to sing Manglacharan in Vilambit laya. 3. Student will be able to play shaan on Harmonium with proficiency. 4. Student will be able to learn light shabad reets in different taals. 5. Students will be able to learn poem on martyrdom of Chote Sahibzade and on Sikh itihaas.

Tabla (Minor -2) MTB -123	1. Define the following musical terms, Avartan, Matra, Mohra, Tihailaya. 2. Ability to demonstrate different layaKaries in Dadra, KeherwaRupak and TeentaalThah and Dugun with description. 3. Ability to play following taals on with the prakars in each: Dadra, Keherwa, Roopak and Teental (different from previous semester) 4. Ability to play one Tihai and Mohra each in the above mentioned Taals 5. Proficiency in Taal – Pehchan. 6. Viva
Compulsory English Eng -121	1. To enhance the critical thinking of the students with the help of poetry and essays. 2. To read and appreciate the beauty of stories on their own. 3. To teach them the intricacies of grammar so that they can make sentences on their own without any grammatical errors. 4. Enable them to understand the difference between formal and informal communication with the help of letter writing. 5. To enlighten and aware students about the literary characteristics of various poetic forms.
Lazmi Punjabi Pbi- 124	1. ਪੁਸਤਕ ਕਾਵਿ-ਧਾਰਾ ਦੇ ਹਵਾਲੇ ਨਾਲ ਸ.ਸ. ਮੀਸ਼ਾ, ਜਸਬੀਰ ਸਿੰਘ ਆਹਲੂਵਾਲੀਆ, ਰਵਿੰਦਰ ਰਵੀ, ਜਗਤਾਰ, ਸੁਰਜੀਤ ਪਾਤਰ, ਪਾਸ਼, ਹਰਿਭਜਨ ਹਲਵਾਰਵੀ, ਮਨਜੀਤ ਟਿਵਾਣਾ ਦੀ ਕਵਿਤਾ ਦੇ ਹਾਵਲੇ ਨਾਲ ਆਧੁਨਿਕ ਪੰਜਾਬੀ ਕਵਿਤਾ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ। 2. ਪੁਸਤਕ ਕਥਾ-ਰੰਗ ਦੇ ਹਵਾਲੇ ਨਾਲ ਅੱਠ ਕਹਾਣੀਆਂ (ਸ਼ਹੀਦ, ਜਿਊਣ ਜੋਗੇ, ਮੂਨ ਦੀ ਅੱਖ, ਇੱਕੀਵੀਂ ਸਦੀ, ਬਠਲੂ ਚਮਿਆਰ, ਜਿੱਥੋਂ ਸੂਰਜ ਉੱਗਦਾ ਹੈ, ਡੂੰਮ) ਦੇ ਸੰਦਰਭ ਵਿਚ ਪੰਜਾਬੀ ਕਹਾਣੀ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ। 3. ਗੁਰਮੁਖੀ ਲਿਪੀ: ਜਨਮ ਅਤੇ ਵਿਕਾਸ, ਗੁਰਮੁਖੀ ਲਿਪੀ ਦੀਆਂ ਵਿਸ਼ੇਸ਼ਤਾਵਾਂ, ਗੁਰਮੁਖੀ ਲਿਪੀ ਦਾ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਨਾਲ ਸੰਬੰਧ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ।

	4. ਵਿਆਕਰਨਿਕ ਸ਼੍ਰੇਣੀਆਂ: ਲੋੜ, ਮਹੱਤਵ ਅਤੇ ਮੁੱਖ ਸੰਕਲਪ - ਵਚਨ, ਲਿੰਗ, ਪੁਰਖ, ਕਾਲ, ਕਾਰਕ ਸਬੰਧੀ ਸਿਧਾਂਤਕ ਅਤੇ ਵਿਹਾਰਿਕ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ।
Semester -3	
Gurmat Sangeet (Major) (Theory) - 3(MGS-201)	1. Acquire the knowledge of classification of ragas used in gurmat sangeet. 2. Acquire the detailed Knowledge of classification of ancient times and its application in Gurmat sangeet. 3. Acquire the knowledge of folk element in Gurmat sangeet. 4. Student will be able to learn about the description of the prescribed ragas and along with comparative study.
Gurmat Sangeet (Major) (Practical) - 3(MGS-202)	1. Acquire the knowledge of singing style of dhrupad. 2. Student will be able to sing the kirtan of Aarti. 3. The student will be able to sing Manglacharan in the Vilambit khyal style. 4. The student will have exposure of new ragas and new taals.
Tabla (Minor) MTB – 203	1. Revision of 1st and 2nd semester syllabus (Practical Portion). 2. Ability to demonstrate EKtaal, Jhaptaal, Pauritaal and Deepchandi on hand as well as Tabla (in than &dugunlayakaries) with description. 3. Ability to play two prakars in each Talas. 4. Ability to play Vilambitteentaal and VilambitEkTaal (in simple form). 5. Ability to play 2 -2 laggies and tihaies in Keherva and Dadra taal 6. Viva

Compulsory English Eng - 201	1. To trace the development history of English Literature. 2. To interpret the text from contemporary point of view. 3. To critically analysis these text as a source of wisdom. 4. To provide them knowledge of English Grammar as, types of clause, translation, complex and compound sentences. 5. To develop critical thinking and imagination through long and short stories, poems and drama.
Lazmi Punjabi Pbi- 214	1. ਪਾਠ-ਪੁਸਤਕ - ਪੰਜਾਬੀ ਕਾਵਿ ਸੰਗ੍ਰਿਹ (1700 ਈ. ਤੱਕ) ਵਿਚੋਂ ਗੁਰਮਤਿ ਕਾਵਿ (ਭਗਤ ਬਾਣੀ+ਗੁਰੂ ਸਾਹਿਬਾਨਾਂ ਦੀ ਬਾਣੀ) ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ। 2. ਇੱਕ ਐਤਵਾਰ, ਜੁੱਤੀਆਂ ਦਾ ਜੋੜਾ, ਨਵਾਂ ਚਾਨਣ, ਡਾਕਟਰ ਪਲਟਾ) ਦੇ ਹਵਾਲੇ ਨਾਲ ਪੰਜਾਬੀ ਨਾਟਕ ਅਤੇ ਇਕਾਂਗੀ ਸਬੰਧੀ ਸੂਝ ਪੈਦਾ ਕਰਨੀ। 3. ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਦਾ ਜਨਮ ਅਤੇ ਵਿਕਾਸ, ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਦੀ ਵਰਤਮਾਨ ਹਾਲਤ (ਸਾਹਿਤ, ਮੀਡੀਆ ਅਤੇ ਵਿੱਦਿਅਕ ਅਦਾਰਿਆਂ ਦੇ ਪ੍ਰਸੰਗ ਵਿਚ) 4. ਧੁਨੀ ਵਿਗਿਆਨ ਅਤੇ ਧੁਨੀ ਵਿਉਂਤ : ਪਰਿਭਾਸ਼ਾ, ਵਰਗੀਕਰਨ ਅਤੇ ਅੰਤਰ-ਨਿਖੇੜ। ਧੁਨੀਆਂ ਦਾ ਵਰਗੀਕਰਨ : ਖੰਡੀ ਅਤੇ ਅਖੰਡੀ ਧੁਨੀਆਂ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ। 5. ਦਫ਼ਤਰੀ ਚਿੱਠੀ-ਪੱਤਰ ਲੇਖਣ ਦਾ ਅਭਿਆਸ ਕਰਵਾਉਣਾ।
Semester - 4	
Gurmat Sangeet (Major) (Theory) – 4 (MGS-221)	1. Acquire the knowledge of Raag Vargikaran system from medieval to modern period. 2. Acquire the knowledge of important concepts of Indian classical music related to time theory. 3. Acquire the knowledge of Partaal style of singing and its theoretical aspect.

	4. Acquire the knowledge of derivation of 484 ragas from one that. 5. Grammatical and theoretical aspect of prescribed ragas and taals.
Gurmat Sangeet (Major) (Practical) – 4 (MGS-222)	1. Student will be able to sing in Partaal style. 2. Student will be able to demonstrate Manglacharan in Vilambit laya. 3. Student will be able to Perform Sodar Chownki in Traditional Style. 4. Student will be able to perform Shabads in Prescribed ragas and taals. 5. The students will be able to learn the technique of playing Tanpura.
Tabla (Minor) - 4 MTB 223	1. Revision of 3rd Semester Syllabus. 2. Ability to play TivraTaal (in thah and dugun laykaries). 3. Ability to play one Kaida, four paltas and one tihai in Teentaal . 4. Proficiency in TaalPehchan. 5. Viva
Compulsory English ENG - 221	1. To equip them to attempt practical criticism of plays, passages and poems To read and appreciate stories on their own. 2. To develop a comparative perspective to study the texts 3. To recognise and discuss the aspects of an author.
Lazmi Punjabi Pbi- 224	1. ਪਾਠ-ਪੁਸਤਕ - ਪੰਜਾਬੀ ਕਾਵਿ ਸੰਗ੍ਰਿਹ (1700 ਈ. ਤੱਕ) ਵਿਚੋਂ ਸੂਫ਼ੀ ਕਾਵਿ ਅਤੇ ਕਿੱਸਾ ਕਾਵਿ (ਸ਼ਾਹ ਹੁਸੈਨ ਦੀਆਂ ਕਾਫ਼ੀਆਂ+ਹੀਰ ਦਮੋਦਰ) ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ। 2. ਪਾਠ-ਪੁਸਤਕ - ਮੰਚ ਦਰਸ਼ਨ ਵਿਚੋਂ ਅਗਲੀਆਂ ਪੰਜ ਇਕਾਂਗੀਆਂ (ਗਊਮੁਖਾ-ਸ਼ੇਰਮੁਖਾ, ਜ਼ੈਲਦਾਰ, ਇਕ ਵਿਚਾਰੀ ਮਾਂ, ਅੰਨ੍ਹੇ ਨਿਸ਼ਾਨਚੀ, ਚਾਬੀਆਂ) ਦੇ ਆਧਾਰ ‘ਤੇ ਪੰਜਾਬੀ ਇਕਾਂਗੀ ਬਾਰੇ ਸਮਝ-ਸੂਝ ਪੈਦਾ ਕਰਨੀ।

	3. ਸ਼ਬਦ ਵਿਗਿਆਨ : ਪਰਿਭਾਸ਼ਾ, ਬਣਤਰ ਅਤੇ ਰਚਨਾ; ਪੰਜਾਬੀ ਭਾਵੰਸ਼ ਵਿਉਂਤ : ਪਰਿਭਾਸ਼ਾ ਅਤੇ ਵਰਗੀਕਰਨ। 4. ਪੰਜਾਬੀ ਸ਼ਬਦ ਜੋੜਾਂ ਦੇ ਨਿਯਮ ਅਤੇ ਸਮੱਸਿਆਵਾਂ। 5. ਇਸ਼ਿਤਿਹਾਰ, ਪ੍ਰੈੱਸ ਨੋਟ ਅਤੇ ਖ਼ਬਰਾਂ : ਲਿਖਣ ਦੀਆਂ ਵਿਧੀਆਂ ਅਤੇ ਨੇਮਾਂ ਬਾਰੇ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ।
Semester -5	
Gurmat Sangeet (Major) (Theory) – 5 (MGS-301)	1. Acquire the knowledge of important banis of shri guru granth sahib ji. 2. Acquire the knowledge of importance of musical instruments in Gurmat sangeet. 3. Acquire the knowledge of Voice Culture and its Various aspects. 4. Acquire the knowledge of Contribution of Bhagats in Gurmat sangeet. 5. Acquire the interim description of parts Tanpura, its playing posture and it's tuning.
Gurmat Sangeet (Major) (Practical) – 5 (MGS-302)	1. Being able to sing Manglacharan in prescribed ragas. 2. Being able to sing Partaal in prescribed ragas. 3. Being able to shabad reets in different taals. 4. Student will be able to perform the kirtan of lavaans. 5. Student will be able to learn the playing technique of changing scale on harmonium from 4^{th} black to 1^{st} white and 2^{nd} black. 6. Student will able to sing welcome song.
Tabla (Minor) -5 MTB 303	1. Ability to play chartaal and Sooltaal. 2. Ability to play 2 ChakkardarParam in Teentaal and Japhtaal 3. Ability to play Uthaan of teentaal and Chartaal. 4. 2 Laggies, Ladi and Tihaies in Keherwa and Dadra taal.

	5. Proficiency in Taal- Pehchan. 6. Viva
Compulsory English Eng - 301	1. Enable students to understand various kinds of business communication tactics and to use them in professional sphere. 2. Make students able to read and understand poetry by enhancing their critical ability. 3. Make them able to inculcate habits of pleasurable reading with the help of novel reading. 4. To learn to use grammar correctly.
Lazmi Punjabi Pbi- 314	1. ਨਾਵਲ : ਸੁੰਦਰੀ (ਭਾਈ ਵੀਰ ਸਿੰਘ) ਦਾ ਪਾਠਗਤ ਅਤੇ ਵਿਸ਼ਾਗਤ ਅਧਿਐਨ ਕਰਵਾਉਣਾ। 2. ਪਾਠ-ਪੁਸਤਕ - ਵਾਤਾਵਰਨ ਚੇਤਨਾ ਵਿਚਲੇ ਲੇਖਾਂ ਦੇ ਆਧਾਰ ‘’ਤੇ ਵਿਦਿਆਰਥੀਆਂ ਵਿਚ ਵਾਤਾਵਰਨ ਚੇਤਨਾ ਪੈਦਾ ਕਰਨੀ। 3. ਵਾਕ-ਵਿਉਂਤ: ਪਰਿਭਾਸ਼ਾ ਅਤੇ ਵਰਗੀਕਰਨ; ਰੂਪ ਦੇ ਆਧਾਰ ‘ਤੇ ਵਾਕ ਵੰਡ- ਸਧਾਰਨ, ਸੰਯੁਕਤ, ਮਿਸ਼ਰਤ। ਕਾਰਜ ਦੇ ਅਧਾਰ ਤੇ ਵਾਕ ਵੰਡ- ਬਿਆਨੀਆ, ਸਵਾਲੀਆ ਅਤੇ ਹੁਕਮੀ ਵਾਕ। 4. ਸੰਚਾਰ: ਪਰਿਭਾਸ਼ਾ ਅਤੇ ਵਰਗੀਕਰਨ, ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਦੇ ਸੰਚਾਰ ਸਾਧਨ: ਪ੍ਰਿੰਟ ਅਤੇ ਬਿਜਲਈ ਮੀਡੀਆ (ਅਖ਼ਬਾਰ, ਰਸਾਲੇ, ਰੇਡੀਓ, ਟੈਲੀਵਿਜਨ, ਕੰਪਿਊਟਰ ਅਤੇ ਇੰਟਰਨੈੱਟ ਦਾ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਲਈ ਯੋਗਦਾਨ) 5. ਕਿਸੇ ਅਣਡਿੱਠੇ ਪੈਰੇ ਦਾ ਢੁੱਕਵਾਂ ਸਿਰਲੇਖ ਅਤੇ ਸੰਖੇਪ-ਰਚਨਾ ਅਭਿਆਸ ਕਰਵਾਉਣਾ।
Value Education, Ethics & Human Rights GSES -301	1. Understanding the need, basic guidelines, content and process of value education, self-exploration, continuous happiness and prosperity, fulfillment of basic aspirations of human being. 2. To learn importance of universal human values and ethical human conduct, basis for holistic alternative towards universal human order 3. To learn about Professional ethics and issues in professional ethics.
Semester - 6	

Gurmat Sangeet (Major) (Theory) – 6 (MGS-321)	1. Acquire the knowledge of elements of gayaki use in Indian classical music. 2. Acquire the knowledge of important baanis of Shri guru Granth sahib ji. 3. Acquire the knowledge of taal system and its importance in Music. 4. Critical study of Notation system. 5. Acquire the knowledge of theoretical aspect of teaching. 6. Role and importance of MUSIC in Human beings. 7. Acquire the knowledge of prescribed ragas and taals.
Gurmat Sangeet (Major) (Practical) – 6 (MGS-322)	1. Acquire the knowledge of singing shabad with Tanpura in given ragas. 2. Being able to sing Manglacharan on prescribed ragas. 3. Being able to sing in the partaal style in the given ragas. 4. The student will be able to perform Saraswati Vandana. 5. Student will learn the art of self composition in different taals. 6. Students will be able to perform with Tanpura. 7. Student will be able to play and sing National Anthem.
Tabla Minor -6 MTB 323	1. Revision of all the previous semester's syllabus. 2. Ability to play 2 Laggi, Ladi and Tihai in Keherwa, Dadra Roopak and Deepchanditaal. 3. Proficiency in Taal- Pehchan. 4. Solo performance in Teentaal (Duration 10 minutes) 2 Uthaan, 2 Kaidas with 6 Paltas, 2 TihaisMukhda and Mohraetc 5. Knowledge of Theka of National Anthem. 6. Viva
Compulsory English Eng - 321	1. To explore different genres and inculcate critical powers by looking at their meticulous details.

	2. To analyse various types of genres ranging from poetry to drama with reference to thematic and other approaches. 3. Enable students to have a peep into the phonetic system of English language by using intonation and stress pattern. 4. To teach syllable structure and syllable division by focusing on mono and disyllabic words. 5. To teach them to use grammar correctly.
Lazmi Punjabi Pbi- 324	1. ਪਾਠ-ਪੁਸਤਕ - ਯਾਦਾਂ ਦੀ ਕੰਨੀ ਦੇ ਆਧਾਰ 'ਤੇ ਵਾਰਤਕ ਸਬੰਧੀ ਸਮਝ-ਸੂਝ ਪੈਦਾ ਕਰਨੀ। 2. ਪਾਠ-ਪੁਸਤਕ - ਵਾਰਤਕ ਵਿਵੇਕ ਦੇ ਆਧਾਰ 'ਤੇ ਆਧੁਨਿਕ ਵਾਰਤਕ ਦੇ ਵਿਸ਼ਾ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ। 3. ਭਾਸ਼ਾ-ਵਿਗਿਆਨਕ ਸ਼ਬਦਾਵਲੀ: ਦੁਭਾਸ਼ਾਵਾਦ, ਬਹੁਭਾਸ਼ਾਵਾਦ, ਮਾਂ-ਬੋਲੀ, ਦੂਜੀ ਭਾਸ਼ਾ, ਸਰਕਾਰੀ ਭਾਸ਼ਾ। 4. ਅਰਥ-ਵਿਗਿਆਨ: ਪਰਿਭਾਸ਼ਾ ਅਤੇ ਲੋੜ, ਅਰਥ ਵਿਸਤਾਰ ਅਤੇ ਸੰਕੋਚ, ਅਰਥ ਉਤਰਾਅ ਅਤੇ ਚੜ੍ਹਾਅ 5. ਪੈਰਾ ਅਨੁਵਾਦ : ਅੰਗਰੇਜ਼ੀ ਤੋਂ ਪੰਜਾਬੀ (ਪੈਰਾ ਲਗਭਗ 100-125 ਸ਼ਬਦਾਂ ਦਾ ਹੋਵੇ)ਅਭਿਆਸ ਕਰਵਾਉਣਾ।
Environmental Studies GSES - 321	1. To understand the need for public awareness for environment. 2. To learn about renewable and non-renewable resources, problems associated with Natural resources. 3. To know about ecosystems, structure and function of an ecosystem. 4. Understand biodiversity and impact on environment, conservations of bio resources. 5. Environmental pollution and causes and remedies.

B.A. Honors Tabla (Major)	
Programme Outcomes	1. To be able to develop performing skills for practical presentation of Tabla. 2. To be able to secure employment as Music teacher at PGT & TGT level in the discipline. 3. To be able to persue the discipline in high education and attain expertise as Performer. 4. The student will be able to develop performing skills thereby enhancing career opportunities through social media like you tube, Facebook & Instagram etc.
Programme Specific Outcomes	1. Students will be able to Perform the various practical aspects of the instrumental presentation in Solo Tabla. 2. being able to perform in Various taals. 3. Being aware of the in-depth knowledge of theoretical aspects of the discipline. 4. Being able to work as accompaniment with different genre of Music like Indian Classical Music, GUrmat Sangeet and Light Music etc. 5. being able to develop fluency in playing Tabla.
	Sesmester 1
MTB Tabla (major theory-1) -101 Ist Sem	1. Knowledge of producing the following vermas. Na, Tin Tu Din Te Ta Dhe, 2. Ability to demonstrate different layakaries e.g Thah, Dugum and Chaugun, Teentaal Rupaktaal 3. Ability to give stage performance in Teentaal with lehra for (10 minutes). 4. Basic knowledge of origin of Tabla.

	5. Importance of Lay and Taal in music. 6. Proficiency of taal Pahchaan.
MTB - 102Tabla Major Practical 1	1. Knowledge of producing the following vermas. Na, Tin Tu Din Te Ta Dhe, 2. Ability to demonstrate different layakaries e.g Thah, Dugum and Chaugun, Teentaal Rupaktaal 3. Ability to give stage performance in Teentaal with lehra for (10 minutes). 4. Basic knowledge of origin of Tabla.
MGS- 103 Gurmat Sangeet (Minor -1)	1. Acquire the knowledge of technical terms used in indian music. 2. Student will be able to sing Alankars in basics thaats. 3. Student will be able to sing Asa Di Vaar (First 12 chakkas) in simple tune. 4. Student will be able to sing simple Shabad tunes with harmonium in Kehrwa taal. 5. Student will be able to recite poem based on Baisakhi.
Compulsory English ENG-101	6. To Understand the correct application of the subject. 7. To enrich their vocabulary 8. To Develop beginning vocabulary and aesthetic sense both 9. Learn to make coherent sentences and propound coherent ideas 10. Close Reading and critical analysis of the Text
Lazmi Punjabi PBI- 114	5. ਪੁਸਤਕ ਕਾਵਿ-ਧਾਰਾ ਦੇ ਹਵਾਲੇ ਨਾਲ ਭਾਈ ਵੀਰ ਸਿੰਘ, ਧਨੀ ਰਾਮ ਚਾਤ੍ਰਿਕ, ਪੂਰਨ ਸਿੰਘ, ਮੋਹਨ ਸਿੰਘ, ਬਾਵਾ ਬਲਵੰਤ, ਪ੍ਰੀਤਮ ਸਿੰਘ ਸਫ਼ੀਰ, ਅੰਮ੍ਰਿਤਾ ਪ੍ਰੀਤਮ, ਹਰਿਭਜਨ ਸਿੰਘ, ਸ਼ਿਵ ਕੁਮਾਰ ਬਟਾਲਵੀ ਦੀ ਕਵਿਤਾ ਦੇ ਹਾਵਲੇ ਨਾਲ ਆਧੁਨਿਕ ਪੰਜਾਬੀ ਕਵਿਤਾ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ। 6. ਪੁਸਤਕ ਕਥਾ-ਰੰਗ ਦੇ ਹਵਾਲੇ ਨਾਲ ਅੱਠ ਕਹਾਣੀਆਂ (ਸਤਾਈ ਜਨਵਰੀ, ਮੁੜ ਵਿਧਵਾ, ਪਠਾਣ ਦੀ ਧੀ, ਤ੍ਰਿਸ਼ਨਾ, ਭੇਤ ਵਾਲੀ ਗੱਲ, ਧਰਤੀ ਹੇਠਲਾ ਬੌਲਦ, ਇਕ ਬਾਲੜੀ ਦੋ ਪਤਾਸੇ, ਮੋਹੜੀ) ਦੇ ਸੰਦਰਭ 7. ਭਾਸ਼ਾ: ਪਰਿਭਾਸ਼ਾ ਅਤੇ ਵਿਸ਼ੇਸ਼ਤਾਵਾਂ, ਭਾਸ਼ਾ ਵੰਨਗੀਆਂ, ਉਪਭਾਸ਼ਾ: ਪਰਿਭਾਸ਼ਾ ਅਤੇ ਵਿਸ਼ੇਸ਼ਤਾਵਾਂ, ਭਾਸ਼ਾ ਤੇ ਉਪਭਾਸ਼ਾ ਦਾ ਅੰਤਰ-ਸੰਬੰਧ,

	ਪੰਜਾਬੀ ਦੀਆਂ ਉਪਭਾਸ਼ਾਈ ਵੰਨਗੀਆਂ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ। 8. ਸ਼ਬਦ ਸ਼੍ਰੇਣੀਆਂ : ਨਾਂਵ, ਪੜਨਾਂਵ, ਵਿਸ਼ੇਸ਼ਣ, ਕਿਰਿਆ, ਕਿਰਿਆ-ਵਿਸ਼ੇਸ਼ਣ, ਸਬੰਧਕ, ਯੋਜਕ, ਵਿਸਮਿਕ ਸਬੰਧੀ ਸਿਧਾਂਤਕ ਅਤੇ ਵਿਹਾਰਿਕ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ।
Semester 2nd	
MTB Tabla (major Theory - 2) – 121 2nd Sem	1. Elementary Knowledge of tuning the instrument 'Tabla' 2. Students will be able to play a Chakradar Tukra, Paran and Tehai. 3. Teental, two Kaidas with six paltas, two Mukhdas, Two Mohras, one Uthan. 4. Accompany with second semester Gurmat Sangeet/ Music Instrumental (Major) class. Practice of playing Nagma on harmonium in Teentaal. 5. Comparison between Tabla and Pakhawaj 6. Proficiency of taal Pachan.
MTB- 122 Tabla (Major Practical)	1. Elementary Knowledge of tuning the instrument 'Tabla' 2. Students will be able to play a Chakradar Tukra, Paran and Tehai. 3. Teental, two Kaidas with six paltas, two Mukhdas, Two Mohras, one Uthan.
Gurmat Sangeet (Minor- 2) MGS -123	1. Student will be able to sing 10 alankars in 3 Thaats. 2. Acquire the knowledge of basic concepts of Gurmat Sangeet and its Comparison with indian Music. 3. Students will be able to sing simple shabad tunes with Harmonium in Dadra taal. 4. Student will be able to sing Asa Di Vaar (Next 12 chakkas) in simple tune. 5. Acquire the knowledge of Banis of Shri Guru Granth sahib ji. 6. Student will be Aware of Salient Feature of Gurmat Sangeet.

	7. Student will be able to sing poem on Martyrdom of Chotte Sahibzade.
Compulsory English ENG-121	6. To enhance the critical thinking of the students with the help of poetry and essays. 7. To read and appreciate the beauty of stories on their own. 8. To teach them the intricacies of grammar so that they can make sentences on their own without any grammatical errors. 9. Enable them to understand the difference between formal and informal communication with the help of letter writing. 10. To enlighten and aware students about the literary characteristics of various poetic forms.
Lazmi Punjabi PBI- 124	5. ਪੁਸਤਕ ਕਾਵਿ-ਧਾਰਾ ਦੇ ਹਵਾਲੇ ਨਾਲ ਸ.ਸ. ਮੀਸ਼ਾ, ਜਸਬੀਰ ਸਿੰਘ ਆਹਲੂਵਾਲੀਆ, ਰਵਿੰਦਰ ਰਵੀ, ਜਗਤਾਰ, ਸੁਰਜੀਤ ਪਾਤਰ, ਪਾਸ਼, ਹਰਿਭਜਨ ਹਲਵਾਰਵੀ, ਮਨਜੀਤ ਟਿਵਾਣਾ ਦੀ ਕਵਿਤਾ ਦੇ ਹਾਵਲੇ ਨਾਲ ਆਧੁਨਿਕ ਪੰਜਾਬੀ ਕਵਿਤਾ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ। 6. ਪੁਸਤਕ ਕਥਾ-ਰੰਗ ਦੇ ਹਵਾਲੇ ਨਾਲ ਅੱਠ ਕਹਾਣੀਆਂ (ਸ਼ਹੀਦ, ਜਿਊਣ ਜੋਗੇ, ਮੂਨ ਦੀ ਅੱਖ, ਇੱਕੀਵੀਂ ਸਦੀ, ਬਠਲੂ ਚਮਿਆਰ, ਜਿੱਥੋਂ ਸੂਰਜ ਉੱਗਦਾ ਹੈ, ਡੂੰਮ) ਦੇ ਸੰਦਰਭ ਵਿਚ ਪੰਜਾਬੀ ਕਹਾਣੀ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ। 7. ਗੁਰਮੁਖੀ ਲਿਪੀ: ਜਨਮ ਅਤੇ ਵਿਕਾਸ, ਗੁਰਮੁਖੀ ਲਿਪੀ ਦੀਆਂ ਵਿਸ਼ੇਸ਼ਤਾਵਾਂ, ਗੁਰਮੁਖੀ ਲਿਪੀ ਦਾ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਨਾਲ ਸੰਬੰਧ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ। **8.** ਵਿਆਕਰਨਿਕ ਸ਼੍ਰੇਣੀਆਂ: ਲੋੜ, ਮਹੱਤਵ ਅਤੇ ਮੁੱਖ ਸੰਕਲਪ - ਵਚਨ, ਲਿੰਗ, ਪੁਰਖ, ਕਾਲ, ਕਾਰਕ ਸਬੰਧੀ ਸਿਧਾਂਤਕ ਅਤੇ ਵਿਹਾਰਿਕ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ।
Semester 3rd	
MTB – 201 3rd Sem	1. Defining the following musical terms Aa, Upaj, Solo Vadan, Ganda-Bandhan, Nagma, 2. Suggestions on the progress of Tabla Solo Vadan. 3. Brief life Sketches of the following Guru, Pandit Kishan Maharaj, Ustad, Allah Rakha Khan.

	4. Defining the different Gharanas of Tabla. 5. Difference between Gharana and Baaj in short 6. Proficiency in Taal Pehchaan.
MTB-202 Tabla Major Practical- 3	1. Defining the following musical terms Aa, Upaj, Solo Vadan, Ganda-Bandhan, Nagma, 2. Suggestions on the progress of Tabla Solo Vadan. 3. Defining the different Gharanas of Tabla.
Gurmat Sangeet (Minor – 3) MGS -203	1. Student will be able to sing 10 Alankars in 3 Thaats. 2. Student will be able to sing So-dar and Aarti. 3. Student will be able to sing poem on Sikh itihas. 4. Student will be able to sing Anand sahib in simple tune. 5. Student will be able to sing Shabad Reets in Kehrwa , Dadra and Roopak taal. 6. Student will be able to demonstrate taals on hand beets.
Compulsory English ENG 201	6. To trace the development history of English Literature. 7. To interpret the text from contemporary point of view. 8. To critically analysis these text as a source of wisdom. 9. To provide them knowledge of English Grammar as, types of clause, translation, complex and compound sentences. 10. To develop critical thinking and imagination through long and short stories, poems and drama.
Lazmi Punjabi PBI- 214	6. ਪਾਠ-ਪੁਸਤਕ - ਪੰਜਾਬੀ ਕਾਵਿ ਸੰਗ੍ਰਿਹ (1700 ਈ. ਤੱਕ) ਵਿਚੋਂ ਗੁਰਮਤਿ ਕਾਵਿ (ਭਗਤ ਬਾਣੀ+ਗੁਰੂ ਸਾਹਿਬਾਨਾਂ ਦੀ ਬਾਣੀ) ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ। 7. ਇੱਕ ਐਤਵਾਰ, ਜੁੱਤੀਆਂ ਦਾ ਜੋੜਾ, ਨਵਾਂ ਚਾਨਣ, ਡਾਕਟਰ ਪਲਟਾ) ਦੇ ਹਵਾਲੇ ਨਾਲ ਪੰਜਾਬੀ ਨਾਟਕ ਅਤੇ ਇਕਾਂਗੀ ਸਬੰਧੀ ਸੂਝ ਪੈਦਾ ਕਰਨੀ। 8. ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਦਾ ਜਨਮ ਅਤੇ ਵਿਕਾਸ, ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਦੀ ਵਰਤਮਾਨ ਹਾਲਤ (ਸਾਹਿਤ, ਮੀਡੀਆ ਅਤੇ ਵਿੱਦਿਅਕ ਅਦਾਰਿਆਂ ਦੇ ਪ੍ਰਸੰਗ ਵਿਚ) 9. ਧੁਨੀ ਵਿਗਿਆਨ ਅਤੇ ਧੁਨੀ ਵਿਉਂਤ : ਪਰਿਭਾਸ਼ਾ, ਵਰਗੀਕਰਨ ਅਤੇ ਅੰਤਰ-ਨਿਖੇੜ। ਧੁਨੀਆਂ ਦਾ ਵਰਗੀਕਰਨ : ਖੰਡੀ ਅਤੇ ਅਖੰਡੀ ਧੁਨੀਆਂ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ।

	10. ਦਫ਼ਤਰੀ ਚਿੱਠੀ-ਪੱਤਰ ਲੇਖਣ ਦਾ ਅਭਿਆਸ ਕਰਵਾਉਣਾ।
Semester 4th	
MTB – 221 4th Sem	1. Life Sketch of Pt. Samta Parsad, Pt Ram Sahai. 2. Detailed study of Partel Gayan Shalley. 3. Being knowledge of Jhoomrataal, PunchamSwaritaal, Addha-taal and Jat-taal Thah, Dugun, Tigun and Aad Laykaries. 4. Merits and demerits of teaching music in institution. 5. Ten Praans of Taal 6. Teentaal, Rupaktaal, Ektaal performance with Lehras.
MTB – 222 Tabla Major Practical - 4	1. Life Sketch of Pt. Samta Parsad, Pt Ram Sahai. 2. Detailed study of Partel Gayan Shalley. 3. Merits and demerits of teaching music in institution.
MGS – 223 Gurmat Sangeet (minor - 4)	1. Student will be able to sing one raag 4-4 Alaaps and tans. 2. Student will be able to sing Shabad Reets in Deepchandi taal. 3. Student will be able to sing welcome song. 4. Student will be able to sing National Anthem. 5. Student will be Able to recite Gurmantra jaap in simple tune.
Compulsory English ENG - 221	4. To equip them to attempt practical criticism of plays, passages and poems To read and appreciate stories on their own. 5. To develop a comparative perspective to study the texts 6. To recognise and discuss the aspects of an author.
Lazmi Punjabi PBI – 224	6. ਪਾਠ-ਪੁਸਤਕ - ਪੰਜਾਬੀ ਕਾਵਿ ਸੰਗ੍ਰਿਹ (1700 ਈ. ਤੱਕ) ਵਿਚੋਂ ਸੂਫ਼ੀ ਕਾਵਿ ਅਤੇ ਕਿੱਸਾ ਕਾਵਿ (ਸ਼ਾਹ ਹੁਸੈਨ ਦੀਆਂ ਕਾਫ਼ੀਆਂ+ਹੀਰ ਦਮੋਦਰ) ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ। 7. ਪਾਠ-ਪੁਸਤਕ - ਮੰਚ ਦਰਸ਼ਨ ਵਿਚੋਂ ਅਗਲੀਆਂ ਪੰਜ ਇਕਾਂਗੀਆਂ (ਗਊਮੁਖਾ-ਸ਼ੇਰਮੁਖਾ, ਜ਼ੈਲਦਾਰ, ਇਕ ਵਿਚਾਰੀ ਮਾਂ, ਅੰਨ੍ਹੇ ਨਿਸ਼ਾਨਚੀ, ਚਾਬੀਆਂ) ਦੇ ਆਧਾਰ 'ਤੇ ਪੰਜਾਬੀ ਇਕਾਂਗੀ ਬਾਰੇ ਸਮਝ-ਸੂਝ ਪੈਦਾ ਕਰਨੀ। 8. ਸ਼ਬਦ ਵਿਗਿਆਨ : ਪਰਿਭਾਸ਼ਾ, ਬਣਤਰ ਅਤੇ ਰਚਨਾ; ਪੰਜਾਬੀ ਭਾਵੰਸ਼ ਵਿਉਂਤ : ਪਰਿਭਾਸ਼ਾ ਅਤੇ ਵਰਗੀਕਰਨ।

	9. ਪੰਜਾਬੀ ਸ਼ਬਦ ਜੋੜਾਂ ਦੇ ਨਿਯਮ ਅਤੇ ਸਮੱਸਿਆਵਾਂ। 10. ਇਸ਼ਿਤਿਹਾਰ, ਪ੍ਰੈੱਸ ਨੋਟ ਅਤੇ ਖ਼ਬਰਾਂ : ਲਿਖਣ ਦੀਆਂ ਵਿਧੀਆਂ ਅਤੇ ਨੇਮਾਂ ਬਾਰੇ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ।
Semester 5th	
MTB – 301 5th Sem	1. Detail study of Principles of Sangat. 2. Ability to write all the practical portion of V Semester. 3. Knowledge of 'North Indian Tall Rachna Sidhant' with ability to form new Taalas. 4. Comparative study in same beats (matras) of taal. 5. Ability to play a Rela of Teentaal with Dhir- Dhir Bols. 6. Ability to give stage& performance in Jhaaptaal, Ektaal, Rupaktaal, Teentaal.
MTB – 302 Tabla Major Practical -5	1. Ability to write all the practical portion of V Semester. 2. Ability to play a Rela of Teentaal with Dhir- Dhir Bols. 3. Ability to give stage& performance in Jhaaptaal, Ektaal, Rupaktaal, Teentaal
MGS – 303 Gurmat Sangeet(Minor -5)	1. Student will be able to sing Raag Bhairav with 4-4 Alaaps and tans. 2. Student will be able to sing patriotic song. 3. Student will be able to sing Choupai sahib in simple tune. 4. Student will be able to sing shabad reets based on birth and death ceremonies. 5. Student will be able to demonstrate taal on hand beets.
Compulsory English ENG - 301	5. Enable students to understand various kinds of business communication tactics and to use them in professional sphere. 6. Make students able to read and understand poetry by enhancing their critical ability. 7. Make them able to inculcate habits of pleasurable reading with the help of novel reading. 8. To learn to use grammar correctly.

Lazmi Punjabi PBI – 314	6. ਨਾਵਲ : ਸੁੰਦਰੀ (ਭਾਈ ਵੀਰ ਸਿੰਘ) ਦਾ ਪਾਠਗਤ ਅਤੇ ਵਿਸ਼ਾਗਤ ਅਧਿਐਨ ਕਰਵਾਉਣਾ। 7. ਪਾਠ–ਪੁਸਤਕ – ਵਾਤਾਵਰਨ ਚੇਤਨਾ ਵਿਚਲੇ ਲੇਖਾਂ ਦੇ ਆਧਾਰ ‘’ਤੇ ਵਿਦਿਆਰਥੀਆਂ ਵਿਚ ਵਾਤਾਵਰਨ ਚੇਤਨਾ ਪੈਦਾ ਕਰਨੀ। 8. ਵਾਕ–ਵਿਉਂਤ: ਪਰਿਭਾਸ਼ਾ ਅਤੇ ਵਰਗੀਕਰਨ; ਰੂਪ ਦੇ ਆਧਾਰ ‘ਤੇ ਵਾਕ ਵੰਡ– ਸਧਾਰਨ, ਸੰਯੁਕਤ, ਮਿਸ਼ਰਤ। ਕਾਰਜ ਦੇ ਅਧਾਰ ਤੇ ਵਾਕ ਵੰਡ– ਬਿਆਨੀਆ, ਸਵਾਲੀਆ ਅਤੇ ਹੁਕਮੀ ਵਾਕ। 9. ਸੰਚਾਰ: ਪਰਿਭਾਸ਼ਾ ਅਤੇ ਵਰਗੀਕਰਨ, ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਦੇ ਸੰਚਾਰ ਸਾਧਨ: ਪ੍ਰਿੰਟ ਅਤੇ ਬਿਜਲਈ ਮੀਡੀਆ (ਅਖ਼ਬਾਰ, ਰਸਾਲੇ, ਰੇਡੀਓ, ਟੈਲੀਵਿਜਨ, ਕੰਪਿਊਟਰ ਅਤੇ ਇੰਟਰਨੈੱਟ ਦਾ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਲਈ ਯੋਗਦਾਨ) 10. ਕਿਸੇ ਅਣਡਿੱਠੇ ਪੈਰੇ ਦਾ ਢੁੱਕਵਾਂ ਸਿਰਲੇਖ ਅਤੇ ਸੰਖੇਪ–ਰਚਨਾ ਅਭਿਆਸ ਕਰਵਾਉਣਾ।
GSES - 301 Value Education, Ethetics and Human Rights	4. Understanding the need, basic guidelines, content and process of value education, self-exploration, continuous happiness and prosperity, fulfillment of basic aspirations of human being. 5. To learn importance of universal human values and ethical human conduct, basis for holistic alternative towards universal human order 6. To learn about Professional ethics and issues in professional ethics.
	Semester 6
MTB – 321 6th Sem	1. Ability to understand to play and differentiate between Khule and Band Bolas. 2. Technical aspects of the following Vadan –Shallies. 3. Ability to give stage & performance in Jhaptaal, Rupaktaal, Ektaal, Teentaal. 4. Ability to play’Baant’ of laggies in Dadra, Keherwa, Roopak and jhaptaal. 5. Oral rendering of practical portion. 6. Comparative study in same beats (matras) of taal.

MTB – 322 (Tabla Major practical -6)	1. Ability to understand to play and differentiate between Khule and Band Bolas. 2. Technical aspects of the following Vadan –Shallies. 3. Ability to play'Baant' of laggies in Dadra, Keherwa, Roopak and jhaptaal.
MGS – 323 Gurmat Sangeet(Minor -6)	1. Student will able to perform raag kalian with Alaaps and Taans. 2. Student will be able to recite a poem in Dhadhi Waaran poem. 3. Student will be able to compose shabad reets by own self. 4. Student will be able to sing shabad reets in Different taals. 5. Student will be able to recite So-dar Chownki
Compulsory English ENG – 321	6. To explore different genres and inculcate critical powers by looking at their meticulous details. 7. To analyse various types of genres ranging from poetry to drama with reference to thematic and other approaches. 8. Enable students to have a peep into the phonetic system of English language by using intonation and stress pattern. 9. To teach syllable structure and syllable division by focusing on mono and disyllabic words. 10. To teach them to use grammar correctly.
Lazmi Punjabi PBI – 324	6. ਪਾਠ-ਪੁਸਤਕ - ਯਾਦਾਂ ਦੀ ਕੰਨੀ ਦੇ ਆਧਾਰ 'ਤੇ ਵਾਰਤਕ ਸਬੰਧੀ ਸਮਝ-ਸੂਝ ਪੈਦਾ ਕਰਨੀ। 7. ਪਾਠ-ਪੁਸਤਕ - ਵਾਰਤਕ ਵਿਵੇਕ ਦੇ ਆਧਾਰ 'ਤੇ ਆਧੁਨਿਕ ਵਾਰਤਕ ਦੇ ਵਿਸ਼ਾ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ। 8. ਭਾਸ਼ਾ-ਵਿਗਿਆਨਕ ਸ਼ਬਦਾਵਲੀ: ਦੁਭਾਸ਼ਾਵਾਦ, ਬਹੁਭਾਸ਼ਾਵਾਦ, ਮਾਂ-ਬੋਲੀ, ਦੂਜੀ ਭਾਸ਼ਾ, ਸਰਕਾਰੀ ਭਾਸ਼ਾ। 9. ਅਰਥ-ਵਿਗਿਆਨ: ਪਰਿਭਾਸ਼ਾ ਅਤੇ ਲੋੜ, ਅਰਥ ਵਿਸਤਾਰ ਅਤੇ ਸੰਕੋਚ, ਅਰਥ ਉਤਰਾਅ ਅਤੇ ਚੜ੍ਹਾਅ 10. ਪੈਰਾ ਅਨੁਵਾਦ : ਅੰਗਰੇਜ਼ੀ ਤੋਂ ਪੰਜਾਬੀ (ਪੈਰਾ ਲਗਭਗ 100-125 ਸ਼ਬਦਾਂ ਦਾ ਹੋਵੇ)ਅਭਿਆਸ ਕਰਵਾਉਣਾ।

GSES Environmental Studies GSES - 321	6. To understand the need for public awareness for environment. 7. To learn about renewable and non-renewable resources, problems associated with Natural resources. 8. To know about ecosystems, structure and function of an ecosystem. 9. Understand biodiversity and impact on environment, conservations of bio resources. 10. Environmental pollution and causes and remedies.

B.A. Honors Music (Instrumental)	
Semester 1	
B.A (Hons)) Music-Programme Outcome	1. To be able to develop performing skills for practical presentation of Instrumental in Hindustani classical Genre. 2. To be able to secure employment as Music teacher at PGT & TGT level in the discipline. 3. To be able to persue the discipline in high education and attain expertise as Performa. 4. The student will be able to develop performing skills enhancing career opportunities through social media like you tube, Facebook & Instagram etc.
Programme Specific Outcome	1. Students will be able to Perform the various practical aspects of the instrumental presentation in Indian classical Music. 2. being able to perform in Various taals. 3. Being aware of the in-depth knowledge of theoretical aspects of the discipline. 4. Being able to give presentation in different Ragaas as well as light Dhun. 5. being able to develop fluency in playing music instrument.
Course Outcome MMI-101 Music Instrumental (major theory -1)	1. Require to know what the basic terminologies of Indian Music which will help him in the proper understanding of not just Hindustani music. 2. Having understood the basic concepts like Laya, Tala, Raaga, and the students will be on course to becoming a performing artist in Hindustani music.
Course Outcome MMI-102 Music Instrumental (major practical -1)	6. The students will know how to tune their Instruments. 7. The students will become well- versed with the teqniques of playing.

	8. Having learnt the Notation System in the theory, the student will able to read and learn ne composition in the prescribed Ragas.
Tabla (Minor-1) MTB-103	9. Knowledge of varn of tabla. 10. Define the music term, Theka, Taal, Taali, Khaali, Vibhag. 11. Knowledge of origin of Tabla. 12. Teentaal, Kahrva taal Thah and Dugun. 13. Dadra, Rupak Theka Prakaar. **14.** Knowledge of Bhatkhande Taal Notation system
Compulsory English Eng - 101	11. To Understand the correct application of the subject. 12. To enrich their vocabulary 13. To Develop beginning vocabulary and aesthetic sense both 14. Learn to make coherent sentences and propound coherent ideas 15. Close Reading and critical analysis of the Text
Lazmi Punjabi Pbi- 114	9. ਪੁਸਤਕ ਕਾਵਿ-ਧਾਰਾ ਦੇ ਹਵਾਲੇ ਨਾਲ ਭਾਈ ਵੀਰ ਸਿੰਘ, ਧਨੀ ਰਾਮ ਚਾਤ੍ਰਿਕ, ਪੂਰਨ ਸਿੰਘ, ਮੋਹਨ ਸਿੰਘ, ਬਾਵਾ ਬਲਵੰਤ, ਪ੍ਰੀਤਮ ਸਿੰਘ ਸਫ਼ੀਰ, ਅੰਮ੍ਰਿਤਾ ਪ੍ਰੀਤਮ, ਹਰਿਭਜਨ ਸਿੰਘ, ਸ਼ਿਵ ਕੁਮਾਰ ਬਟਾਲਵੀ ਦੀ ਕਵਿਤਾ ਦੇ ਹਾਵਲੇ ਨਾਲ ਆਧੁਨਿਕ ਪੰਜਾਬੀ ਕਵਿਤਾ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ। 10. ਪੁਸਤਕ ਕਥਾ-ਰੰਗ ਦੇ ਹਵਾਲੇ ਨਾਲ ਅੱਠ ਕਹਾਣੀਆਂ (ਸਤਾਈ ਜਨਵਰੀ, ਮੁੜ ਵਿਧਵਾ, ਪਠਾਣ ਦੀ ਧੀ, ਤ੍ਰਿਸ਼ਨਾ, ਭੇਤ ਵਾਲੀ ਗੱਲ, ਧਰਤੀ ਹੇਠਲਾ ਬੌਲਦ, ਇਕ ਬਾਲੜੀ ਦੇ ਪਤਾਸੇ, ਮੋਹੜੀ) ਦੇ ਸੰਦਰਭ 11. ਭਾਸ਼ਾ: ਪਰਿਭਾਸ਼ਾ ਅਤੇ ਵਿਸ਼ੇਸ਼ਤਾਵਾਂ, ਭਾਸ਼ਾ ਵੰਨਗੀਆਂ, ਉਪਭਾਸ਼ਾ: ਪਰਿਭਾਸ਼ਾ ਅਤੇ ਵਿਸ਼ੇਸ਼ਤਾਵਾਂ, ਭਾਸ਼ਾ ਤੇ ਉਪਭਾਸ਼ਾ ਦਾ ਅੰਤਰ-ਸੰਬੰਧ, ਪੰਜਾਬੀ ਦੀਆਂ ਉਪਭਾਸ਼ਾਈ ਵੰਨਗੀਆਂ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ। 12. ਸ਼ਬਦ ਸ਼੍ਰੇਣੀਆਂ : ਨਾਂਵ, ਪੜਨਾਂਵ, ਵਿਸ਼ੇਸ਼ਣ, ਕਿਰਿਆ, ਕਿਰਿਆ-ਵਿਸ਼ੇਸ਼ਣ, ਸਬੰਧਕ, ਯੋਜਕ, ਵਿਸਮਿਕ ਸਬੰਧੀ ਸਿਧਾਂਤਕ ਅਤੇ ਵਿਹਾਰਿਕ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ।
	Semester 2
Course Outcome MMI-121 (Music Instrumental (major theory -2)	1. The students will know the origin and development of own Instrument. 2. They come to understand the concept of Tala and te use of various taals in Hindustani music, especially Ragas.
Course Outcome MMI – 122 Music Instrumental (major practical -1)	1. The students will learn the art of playing that on own Instruments. 2. The student will know how to play Maseetkhani& Vilambit Gat with simple alap and todas to own Instruments.

Tabla (Minor -2) MTB - 123	7. Define the following musical terms, Avartan, Matra, Mohra, Tihai laya. 8. Ability to demonstrate different layaKaries in Dadra, Keherwa Rupak and Teentaal Thah and Dugun with description. 9. Ability to play following taals on with the prakars in each: Dadra, Keherwa, Roopak and Teental (different from previous semester) 10. Ability to play one Tihai and Mohra each in the above mentioned Taalas 11. Proficiency in Taal – Pehchan. 12. Viva
Compulsory English Eng - 121	11. To enhance the critical thinking of the students with the help of poetry and essays. 12. To read and appreciate the beauty of stories on their own. 13. To teach them the intricacies of grammar so that they can make sentences on their own without any grammatical errors. 14. Enable them to understand the difference between formal and informal communication with the help of letter writing. 15. To enlighten and aware students about the literary characteristics of various poetic forms.
Lazmi Punjabi Pbi- 124	9. ਪੁਸਤਕ ਕਾਵਿ-ਧਾਰਾ ਦੇ ਹਵਾਲੇ ਨਾਲ ਸ.ਸ. ਮੀਸ਼ਾ, ਜਸਬੀਰ ਸਿੰਘ ਆਹਲੂਵਾਲੀਆ, ਰਵਿੰਦਰ ਰਵੀ, ਜਗਤਾਰ, ਸੁਰਜੀਤ ਪਾਤਰ, ਪਾਸ਼, ਹਰਿਭਜਨ ਹਲਵਾਰਵੀ, ਮਨਜੀਤ ਟਿਵਾਣਾ ਦੀ ਕਵਿਤਾ ਦੇ ਹਾਵਲੇ ਨਾਲ ਆਧੁਨਿਕ ਪੰਜਾਬੀ ਕਵਿਤਾ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ। 10. ਪੁਸਤਕ ਕਥਾ-ਰੰਗ ਦੇ ਹਵਾਲੇ ਨਾਲ ਅੱਠ ਕਹਾਣੀਆਂ (ਸ਼ਹੀਦ, ਜਿਊਣ ਜੋਗੇ, ਮੂਨ ਦੀ ਅੱਖ, ਇੱਕੀਵੀਂ ਸਦੀ, ਬਠਲੂ ਚਮਿਆਰ, ਜਿੱਥੋਂ ਸੂਰਜ ਉੱਗਦਾ ਹੈ, ਡੂੰਮ) ਦੇ ਸੰਦਰਭ ਵਿਚ ਪੰਜਾਬੀ ਕਹਾਣੀ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ। 11. ਗੁਰਮੁਖੀ ਲਿਪੀ: ਜਨਮ ਅਤੇ ਵਿਕਾਸ, ਗੁਰਮੁਖੀ ਲਿਪੀ ਦੀਆਂ ਵਿਸ਼ੇਸ਼ਤਾਵਾਂ, ਗੁਰਮੁਖੀ ਲਿਪੀ ਦਾ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਨਾਲ ਸੰਬੰਧ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ। **12.** ਵਿਆਕਰਨਿਕ ਸ਼੍ਰੇਣੀਆਂ: ਲੋੜ, ਮਹੱਤਵ ਅਤੇ ਮੁੱਖ ਸੰਕਲਪ - ਵਚਨ, ਲਿੰਗ, ਪੁਰਖ, ਕਾਲ, ਕਾਰਕ ਸਬੰਧੀ ਸਿਧਾਂਤਕ ਅਤੇ ਵਿਹਾਰਿਕ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ।
	Semester 3
Course Outcome MMI – 201 Music Instrumental (major theory -3)	1. Acqire the knowledge of origin & development of student's own instrument 2. .Acquire the knowledge of Shri Guru Granth Sahib Ji. 3. Being aware of Identification of Ragas. 4. Aquire the knowledge of comparative study to their Samprakritik Ragas.

Course Outcome MMI – 202 Music Instrumental (major practical -3)	1. The student will be able to know the grammatical aspects of the prescribed Ragas, like how they arise. 2. Student will gain of how to play Jhala in the prescribed Ragas.
Tabla (Minor) MTB - 203	7. Revision of 1st and 2nd semester syllabus (Practical Portion). 8. Ability to demonstrate EKtaal, Jhaptaal, Pauritaal and Deepchandi on hand as well as Tabla (in than & dugun layakaries) with description. 9. Ability to play two prakars in each Talas. 10. Ability to play Vilambit teentaal and Vilambit Ek Taal (in simple form). 11. Ability to play 2 -2 laggies and tihaies in Keherva and Dadra taal 12. Viva
Compulsory English Eng - 201	11. To trace the development history of English Literature. 12. To interpret the text from contemporary point of view. 13. To critically analysis these text as a source of wisdom. 14. To provide them knowledge of English Grammar as, types of clause, translation, complex and compound sentences. 15. To develop critical thinking and imagination through long and short stories, poems and drama.
Lazmi Punjabi Pbi- 214	11. ਪਾਠ-ਪੁਸਤਕ - ਪੰਜਾਬੀ ਕਾਵਿ ਸੰਗ੍ਰਿਹ (1700 ਈ. ਤੱਕ) ਵਿਚੋਂ ਗੁਰਮਤਿ ਕਾਵਿ (ਭਗਤ ਬਾਣੀ+ਗੁਰੂ ਸਾਹਿਬਾਨਾਂ ਦੀ ਬਾਣੀ) ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ। 12. ਇੱਕ ਐਤਵਾਰ, ਜੁੱਤੀਆਂ ਦਾ ਜੋੜਾ, ਨਵਾਂ ਚਾਨਣ, ਡਾਕਟਰ ਪਲਟਾ) ਦੇ ਹਵਾਲੇ ਨਾਲ ਪੰਜਾਬੀ ਨਾਟਕ ਅਤੇ ਇਕਾਂਗੀ ਸਬੰਧੀ ਸੂਝ ਪੈਦਾ ਕਰਨੀ। 13. ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਦਾ ਜਨਮ ਅਤੇ ਵਿਕਾਸ, ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਦੀ ਵਰਤਮਾਨ ਹਾਲਤ (ਸਾਹਿਤ, ਮੀਡੀਆ ਅਤੇ ਵਿੱਦਿਅਕ ਅਦਾਰਿਆਂ ਦੇ ਪ੍ਰਸੰਗ ਵਿਚ) 14. ਧੁਨੀ ਵਿਗਿਆਨ ਅਤੇ ਧੁਨੀ ਵਿਉਂਤ : ਪਰਿਭਾਸ਼ਾ, ਵਰਗੀਕਰਨ ਅਤੇ ਅੰਤਰ-ਨਿਖੇੜ। ਧੁਨੀਆਂ ਦਾ ਵਰਗੀਕਰਨ : ਖੰਡੀ ਅਤੇ ਅਖੰਡੀ ਧੁਨੀਆਂ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ। 15. ਦਫ਼ਤਰੀ ਚਿੱਠੀ-ਪੱਤਰ ਲੇਖਣ ਦਾ ਅਭਿਆਸ ਕਰਵਾਉਣਾ।
	Semester 4
Course Outcome MMI – 221 Music Instrumental (major theory -4)	1. Aquire the knowledge of music from Medieval period to present time. 2. The student will be able to know Importance of laya & taal in music.

	3. Being aware of proficiency in Raag Pelelaan by different swar-smooh. 4. The student will know the technique of proper handling of own instrument.
Course Outcome MMI – 222 Music Instrumental (major practical -4)	1. Able to play the composition in drut laya. 2. The student will learn Dheem in phari & Khamaj Raag. 3. Acquire the knowledge of Ada chau taal & Teevra taal by Rana in (than4 Dugun layakari) with description.
Tabla (Minor) - 4 MTB 223	6. Revision of 3rd Semester Syllabus. 7. Ability to play Tivra Taal (in thah and dugun laykaries). 8. Ability to play one Kaida, four paltas and one tihai in Teentaal . 9. Proficiency in Taal Pehchan. 10. Viva
Compulsory English ENG - 221	7. To equip them to attempt practical criticism of plays, passages and poems To read and appreciate stories on their own. 8. To develop a comparative perspective to study the texts 9. To recognise and discuss the aspects of an author.
Lazmi Punjabi PBI – 224	11. ਪਾਠ-ਪੁਸਤਕ - ਪੰਜਾਬੀ ਕਾਵਿ ਸੰਗ੍ਰਿਹ (1700 ਈ. ਤੱਕ) ਵਿਚੋਂ ਸੂਫ਼ੀ ਕਾਵਿ ਅਤੇ ਕਿੱਸਾ ਕਾਵਿ (ਸ਼ਾਹ ਹੁਸੈਨ ਦੀਆਂ ਕਾਫ਼ੀਆਂ+ਹੀਰ ਦਮੋਦਰ) ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ। 12. ਪਾਠ-ਪੁਸਤਕ - ਮੰਚ ਦਰਸ਼ਨ ਵਿਚੋਂ ਅਗਲੀਆਂ ਪੰਜ ਇਕਾਂਗੀਆਂ (ਗਊਮੁਖਾ-ਸ਼ੇਰਮੁਖਾ, ਜ਼ੈਲਦਾਰ, ਇਕ ਵਿਚਾਰੀ ਮਾਂ, ਅੰਨ੍ਹੇ ਨਿਸ਼ਾਨਚੀ, ਚਾਬੀਆਂ) ਦੇ ਆਧਾਰ 'ਤੇ ਪੰਜਾਬੀ ਇਕਾਂਗੀ ਬਾਰੇ ਸਮਝ-ਸੂਝ ਪੈਦਾ ਕਰਨੀ। 13. ਸ਼ਬਦ ਵਿਗਿਆਨ : ਪਰਿਭਾਸ਼ਾ, ਬਣਤਰ ਅਤੇ ਰਚਨਾ; ਪੰਜਾਬੀ ਭਾਵੰਸ਼ ਵਿਉਂਤ : ਪਰਿਭਾਸ਼ਾ ਅਤੇ ਵਰਗੀਕਰਨ। 14. ਪੰਜਾਬੀ ਸ਼ਬਦ ਜੋੜਾਂ ਦੇ ਨਿਯਮ ਅਤੇ ਸਮੱਸਿਆਵਾਂ। 15. ਇਸ਼ਿਤਿਹਾਰ, ਪ੍ਰੈੱਸ ਨੋਟ ਅਤੇ ਖ਼ਬਰਾਂ : ਲਿਖਣ ਦੀਆਂ ਵਿਧੀਆਂ ਅਤੇ ਨੇਮਾਂ ਬਾਰੇ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ।
	Semester 5
Course Outcome MMI – 301 Music Instrumental (major theory -5)	1. The student will come to know about the time theory of Ragas its importance in contemporary music scene with particular study of the following: (a) Adhav darshak swar (b) Seasonal Ragas etc. 2. The student will gain knowledge of power of music.

	3. They gain knowledge of the prescribed Raagas with Notation and in comparison to their samprakritik Raagas. The students will know about the life and contribution of legends how their works have shaped the present Hindustani music.
Course Outcome MMI – 302 Music Instrumental (major practical -5)	1. The student will gain self – belief alaw Meend in a Raagas, after practising its Finer details. 2. He will be able to play a Dhun with in depth knowledge of its style of performance.
Tabla (Minor) -5 MTB 303	7. Ability to play chartaal and Sooltaal. 8. Ability to play 2 Chakkardar Param in Teentaal and Japhtaal 9. Ability to play Uthaan of teentaal and Chartaal. 10. 2 Laggies, Ladi and Tihaies in Keherwa and Dadra taal. 11. Proficiency in Taal- Pehchan. 12. Viva
Compulsory English Eng - 301	9. Enable students to understand various kinds of business communication tactics and to use them in professional sphere. 10. Make students able to read and understand poetry by enhancing their critical ability. 11. Make them able to inculcate habits of pleasurable reading with the help of novel reading. 12. To learn to use grammar correctly.
Lazmi Punjabi Pbi- 314	11. ਨਾਵਲ : ਸੁੰਦਰੀ (ਭਾਈ ਵੀਰ ਸਿੰਘ) ਦਾ ਪਾਠਗਤ ਅਤੇ ਵਿਸ਼ਾਗਤ ਅਧਿਐਨ ਕਰਵਾਉਣਾ। 12. ਪਾਠ-ਪੁਸਤਕ - ਵਾਤਾਵਰਨ ਚੇਤਨਾ ਵਿਚਲੇ ਲੇਖਾਂ ਦੇ ਆਧਾਰ ''ਤੇ ਵਿਦਿਆਰਥੀਆਂ ਵਿਚ ਵਾਤਾਵਰਨ ਚੇਤਨਾ ਪੈਦਾ ਕਰਨੀ। 13. ਵਾਕ-ਵਿਉਂਤ: ਪਰਿਭਾਸ਼ਾ ਅਤੇ ਵਰਗੀਕਰਨ; ਰੂਪ ਦੇ ਆਧਾਰ 'ਤੇ ਵਾਕ ਵੰਡ- ਸਧਾਰਨ, ਸੰਯੁਕਤ, ਮਿਸ਼ਰਤ। ਕਾਰਜ ਦੇ ਅਧਾਰ ਤੇ ਵਾਕ ਵੰਡ- ਬਿਆਨੀਆ, ਸਵਾਲੀਆ ਅਤੇ ਹੁਕਮੀ ਵਾਕ। 14. ਸੰਚਾਰ: ਪਰਿਭਾਸ਼ਾ ਅਤੇ ਵਰਗੀਕਰਨ, ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਦੇ ਸੰਚਾਰ ਸਾਧਨ: ਪ੍ਰਿੰਟ ਅਤੇ ਬਿਜਲਈ ਮੀਡੀਆ (ਅਖ਼ਬਾਰ, ਰਸਾਲੇ, ਰੇਡੀਓ, ਟੈਲੀਵਿਜਨ, ਕੰਪਿਊਟਰ ਅਤੇ ਇੰਟਰਨੈੱਟ ਦਾ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਲਈ ਯੋਗਦਾਨ) 15. ਕਿਸੇ ਅਣਡਿੱਠੇ ਪੈਰੇ ਦਾ ਢੁੱਕਵਾਂ ਸਿਰਲੇਖ ਅਤੇ ਸੰਖੇਪ-ਰਚਨਾ ਅਭਿਆਸ ਕਰਵਾਉਣਾ।

Value Education, Ethics & Human Rights GSES -301	7. Understanding the need, basic guidelines, content and process of value education, self-exploration, continuous happiness and prosperity, fulfillment of basic aspirations of human being. 8. To learn importance of universal human values and ethical human conduct, basis for holistic alternative towards universal human order 9. To learn about Professional ethics and issues in professional ethics.
	Semester 6
Course Outcome MMI – 321 (Music Instrumental (major theory -5)	1. The student will be able to know the scientific analysis of the principal of music. 2. The students learn the description of the taals with various layakaries in Notation. 3. Students learn and able to write the Notation of prescribed Raagas.
Course Outcome MMI – 322 (Music Instrumental (major practical -6)	1. Students will develop the ability to demonstration a few teqniques of own Instrument. 2. The student will develop the confidence to perform of raga for a long duration of time. 3. The studemt will develop the confidence to differentiate between similar Ragas.
Tabla Minor -6 MTB 323	7. Revision of all the previous semester's syllabus. 8. Ability to play 2 Laggi, Ladi and Tihai in Keherwa, Dadra Roopak and Deepchandi taal. 9. Proficiency in Taal- Pehchan. 10. Solo performance in Teentaal (Duration 10 minutes) 2 Uthaan, 2 Kaidas with 6 Paltas, 2 Tihais Mukhda and Mohra etc 11. Knowledge of Theka of National Anthem. 12. Viva
Compulsory English Eng - 321	11. To explore different genres and inculcate critical powers by looking at their meticulous details. 12. To analyse various types of genres ranging from poetry to drama with reference to thematic and other approaches. 13. Enable students to have a peep into the phonetic system of English language by using intonation and stress pattern. 14. To teach syllable structure and syllable division by focusing on mono and disyllabic words. 15. To teach them to use grammar correctly.
Lazmi Punjabi Pbi- 324	11. ਪਾਠ-ਪੁਸਤਕ - ਯਾਦਾਂ ਦੀ ਕੰਨੀ ਦੇ ਆਧਾਰ 'ਤੇ ਵਾਰਤਕ ਸਬੰਧੀ ਸਮਝ-ਸੂਝ ਪੈਦਾ ਕਰਨੀ।

	12. ਪਾਠ-ਪੁਸਤਕ - ਵਾਰਤਕ ਵਿਵੇਕ ਦੇ ਆਧਾਰ 'ਤੇ ਆਧੁਨਿਕ ਵਾਰਤਕ ਦੇ ਵਿਸ਼ਾ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ। 13. ਭਾਸ਼ਾ-ਵਿਗਿਆਨਕ ਸ਼ਬਦਾਵਲੀ: ਦੁਭਾਸ਼ਾਵਾਦ, ਬਹੁਭਾਸ਼ਾਵਾਦ, ਮਾਂ-ਬੋਲੀ, ਦੂਜੀ ਭਾਸ਼ਾ, ਸਰਕਾਰੀ ਭਾਸ਼ਾ। 14. ਅਰਥ-ਵਿਗਿਆਨ: ਪਰਿਭਾਸ਼ਾ ਅਤੇ ਲੋੜ, ਅਰਥ ਵਿਸਤਾਰ ਅਤੇ ਸੰਕੋਚ, ਅਰਥ ਉਤਰਾਅ ਅਤੇ ਚੜ੍ਹਾਅ 15. ਪੈਰਾ ਅਨੁਵਾਦ : ਅੰਗਰੇਜ਼ੀ ਤੋਂ ਪੰਜਾਬੀ (ਪੈਰਾ ਲਗਭਗ 100-125 ਸ਼ਬਦਾਂ ਦਾ ਹੋਵੇ)ਅਭਿਆਸ ਕਰਵਾਉਣਾ।
Environmental Studies GSES -321	11. To understand the need for public awareness for environment. 12. To learn about renewable and non-renewable resources, problems associated with Natural resources. 13. To know about ecosystems, structure and function of an ecosystem. 14. Understand biodiversity and impact on environment, conservations of bio resources. 15. Environmental pollution and causes and remedies.

Program Outcomes, Program Specific Outcomes & Course Outcomes of B.A. Humanities	
Program Outcomes	**Outcomes**
PO1.	The students acquire knowledge in the field of social sciences, literature and humanities which make them sensitive and sensible enough.
PO2.	The B.A. graduates will be acquainted with the social, economic, historical, geographical, political, ideological and philosophical tradition and thinking.
PO3.	The program also empowers the graduates to appear for various competitive examinations or choose the post graduate programme of their choice.
PO4.	The B. A. program enables the students to acquire the knowledge with human values framing the base to deal with various problems in life with courage and humanity
PO5.	The students will be ignited enough to think and act over for the solution of various issues prevailing in the human life to make this world better than ever.
PO6.	Programme provides the base to be the responsible citizen.
PO7.	ਪੰਜਾਬੀ ਭਾਸ਼ਾ, ਸਾਹਿਤ ਅਤੇ ਸਭਿਆਚਾਰ ਬਾਰੇ ਵਿਦਿਆਰਥੀਆਂ ਵਿਚ ਮੁੱਢਲੀ ਸਮਝ ਪੈਦਾ ਕਰਨੀ।
Program Specific Outcomes	**Outcomes**
PSO1.	Fine arts contribute to the gradual civilization of man by activating his sense perceptions sharply so as to be quick enough to react to their appeal.
PSO2.	They will be confident at Listening (comprehending), speaking, reading and writing skills.
PSO3.	Students will demonstrate oral communication skills needed to participate in a conversation that builds knowledge collaboratively: listening carefully and respectfully to others' viewpoints; articulating their own ideas and questions clearly; and situating their own ideas while facing real life problems.
PSO4.	Students will be able to increase confidence in speaking publicly. Students will be able to prepare, organize, and deliver an engaging oral presentation.
PSO5.	Students will be able to write effectively for a variety of professional and social settings. They will practice writing as a process of motivated inquiry.
PSO6.	They will demonstrate an ability to revise for content and edit for grammatical and stylistic clarity. And they will develop an awareness of and confidence in their own voice as a writer
PSO7.	1. ਆਧੁਨਿਕ ਪੰਜਾਬੀ ਕਵਿਤਾ ਵਿਚਲੇ ਪ੍ਰਮੁੱਖ ਕਵੀਆਂ ਦੀ ਕਵਿਤਾ ਸਬੰਧੀ ਸੂਝ ਪੈਦਾ ਕਰਨੀ।
PSO8.	ਆਧੁਨਿਕ ਪੰਜਾਬੀ ਕਹਾਣੀ ਬਾਰੇ ਪ੍ਰਮੁੱਖ ਕਹਾਣੀਕਾਰਾਂ ਦੇ ਹਵਾਲੇ ਨਾਲ ਸਮਝ-ਸੂਝ ਪੈਦਾ ਕਰਨੀ।
PSO9.	ਵਿਆਕਰਣ ਵਿਚਲੀਆਂ ਸ਼ਬਦ ਸ਼ੇਣੀਆਂ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਪੈਦਾ ਕਰਨੀ।
PSO10.	ਮੱਧਕਾਲੀ ਪੰਜਾਬੀ ਕਵਿਤਾ ਵਿਚਲੇ ਗੁਰਮਤਿ ਕਾਵਿ, ਕਿੱਸਾ ਕਾਵਿ, ਸੂਫੀ ਕਾਵਿ ਬਾਰੇ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ।
PSO11.	ਨਾਟਕ ਅਤੇ ਇਕਾਂਗੀ ਬਾਰੇ ਸਿਧਾਂਤਕ ਅਤੇ ਵਿਹਾਰਿਕ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ।
PSO12.	ਪੰਜਾਬੀ ਨਾਵਲ ਸਬੰਧੀ ਸਮਝ-ਸੂਝ ਪੈਦਾ ਕਰਨੀ।
PSO13.	ਆਧੁਨਿਕ ਵਾਰਤਕ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ।
Course Outcomes	**Outcomes BA (Hum.) Sem. I**
Compulsory English-I (Introduction) ENG-116	CO I: To know and appreciate the location of literature within humanities CO II: To establish connections across frontiers of disciplines CO III: To become acquainted with grammar and representation. CO IV: To develop critical thinking in students

	CO V: To know the process of beginning and growth of English language
Functional English-I ENG 117	CO I: To appreciate, interpret and critically evaluate literature. CO II: To form an idea about the various stages in the development of English language. CO III: To speak and write choosing from a wider range of vocabulary CO IV: To refer to the dictionary for meaning, usage and grammar CO V: To become proficient in English for global competency
ਲਾਜ਼ਮੀ ਪੰਜਾਬੀ (PBI-114)	CO1.ਪੁਸਤਕ ਕਾਵਿ-ਧਾਰਾ ਦੇ ਹਵਾਲੇ ਨਾਲ ਭਾਈ ਵੀਰ ਸਿੰਘ, ਧਨੀ ਰਾਮ ਚਾਤ੍ਰਿਕ, ਪੂਰਨ ਸਿੰਘ, ਮੋਹਨ ਸਿੰਘ, ਬਾਵਾ ਬਲਵੰਤ, ਪ੍ਰੀਤਮ ਸਿੰਘ ਸਫ਼ੀਰ, ਅੰਮ੍ਰਿਤਾ ਪ੍ਰੀਤਮ, ਹਰਿਭਜਨ ਸਿੰਘ, ਸ਼ਿਵ ਕੁਮਾਰ ਬਟਾਲਵੀ ਦੀ ਕਵਿਤਾ ਦੇ ਹਾਵਲੇ ਨਾਲ ਆਧੁਨਿਕ ਪੰਜਾਬੀ ਕਵਿਤਾ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ। CO2. ਪੁਸਤਕ ਕਥਾ-ਰੰਗ ਦੇ ਹਵਾਲੇ ਨਾਲ ਅੱਠ ਕਹਾਣੀਆਂ (ਸਤਾਈ ਜਨਵਰੀ, ਮੁੜ ਵਿਧਵਾ, ਪਠਾਣ ਦੀ ਧੀ, ਤ੍ਰਿਸ਼ਨਾ, ਭੇਤ ਵਾਲੀ ਗੱਲ, ਧਰਤੀ ਹੇਠਲਾ ਬੌਲਦ, ਇਕ ਬਾਲੜੀ ਦੋ ਪਤਾਸੇ, ਮੋਹੜੀ) ਦੇ ਸੰਦਰਭ CO3. ਭਾਸ਼ਾ: ਪਰਿਭਾਸ਼ਾ ਅਤੇ ਵਿਸ਼ੇਸ਼ਤਾਵਾਂ, ਭਾਸ਼ਾ ਵੰਨਗੀਆਂ, ਉਪਭਾਸ਼ਾ: ਪਰਿਭਾਸ਼ਾ ਅਤੇ ਵਿਸ਼ੇਸ਼ਤਾਵਾਂ, ਭਾਸ਼ਾ ਤੇ ਉਪਭਾਸ਼ਾ ਦਾ ਅੰਤਰ-ਸੰਬੰਧ, ਪੰਜਾਬੀ ਦੀਆਂ ਉਪਭਾਸ਼ਾਈ ਵੰਨਗੀਆਂ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ। CO4. ਸ਼ਬਦ ਸ਼੍ਰੇਣੀਆਂ : ਨਾਂਵ, ਪੜਨਾਂਵ, ਵਿਸ਼ੇਸ਼ਣ, ਕਿਰਿਆ, ਕਿਰਿਆ-ਵਿਸ਼ੇਸ਼ਣ, ਸਬੰਧਕ, ਯੋਜਕ, ਵਿਸਮਿਕ ਸਬੰਧੀ ਸਿਧਾਂਤਕ ਅਤੇ ਵਿਹਾਰਿਕ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ।
ਸਾਹਿਤ ਸਿਧਾਂਤ, ਆਲੋਚਨਾ ਅਤੇ ਇਤਿਹਾਸਕਾਰੀ (PBI-115)	CO1. ਸਾਹਿਤ: ਪਰਿਭਾਸ਼ਾ, ਤੱਤ ਤੇ ਉਦੇਸ਼, ਸਾਹਿਤ ਦਾ ਸਮਾਜ, ਸਭਿਆਚਾਰ ਅਤੇ ਧਰਮ ਨਾਲ ਅੰਤਰ-ਸਬੰਧ। CO2. ਭਾਰਤੀ ਕਾਵਿ-ਸ਼ਾਸਤਰ: ਰਸ, ਧੁਨੀ ਅਤੇ ਅਲੰਕਾਰ। CO3. ਛੰਦ-ਸ਼ਾਸਤਰ: ਪਰਿਭਾਸ਼ਾ ਅਤੇ ਸਰੂਪ, ਛੰਦਾਂ ਬਾਰੇ ਸਿਧਾਂਤਕ ਅਤੇ ਵਿਹਾਰਕ ਜਾਣਕਾਰੀ (ਦੋਹਿਰਾ, ਬੈਂਤ, ਕੋਰੜਾ, ਕਬਿੱਤ, ਸੋਰਠਾ, ਦਵੱਈਆ)। CO4. ਸਾਹਿਤ ਇਤਿਹਾਸਕਾਰੀ: ਪਰਿਭਾਸ਼ਾ, ਲੋੜ ਅਤੇ ਸਰੂਪ, ਪੰਜਾਬੀ ਸਾਹਿਤ ਦੀ ਇਤਿਹਾਸਕਾਰੀ ਬਾਰੇ ਸੰਖੇਪ ਜਾਣਕਾਰੀ। CO5. ਸਾਹਿਤ ਆਲੋਚਨਾ: ਸਿਧਾਂਤਕ ਜਾਣ-ਪਛਾਣ, ਮੁੱਢਲੇ ਪੰਜਾਬੀ ਆਲੋਚਕ: ਬਾਵਾ ਬੁੱਧ ਸਿੰਘ ਅਤੇ ਮੌਲਾ ਬਖਸ਼ ਕੁਸ਼ਤਾ ਦੁਆਰਾ ਪੰਜਾਬੀ ਆਲੋਚਨਾ ਦੇ ਖੇਤਰ ਵਿਚ ਯੋਗਦਾਨ। CO6. ਵਿਹਾਰਕ ਆਲੋਚਨਾ: ਪਰਿਭਾਸ਼ਾ, ਸਰੂਪ, ਨੇਮ ਅਤੇ ਅਭਿਆਸ।
HND-101	CO1: Understand about basic Basics of Samanya Bhasha Vigyan and Hindi Bhasha

	CO2: To know the Hindi Bhasha ka Uday avam Vikas CO3: To know about Adikal, Madhyakal avam Adhunik Kal
Course Outcomes	**Outcomes BA (Hum.) Sem. II**
Compulsory English-II (A Step Ahead) ENG-126	CO I: To enhance their close reading skill. CO II: To develop the sensitivity of language. CO III: To strengthen the aesthetic sense CO IV: To enhance LSRW communicative skills through language and literature CO V: To improve vocabulary and develop the writing skills
Functional English-II ENG 127	CO I: To know about various innovative ways of using English language in verbal and non-Know about various innovative ways of using English language in verbal and non-verbal communications. -verbal communications. CO II: To boost up critical thinking and writing CO III: To offer a platform to express creativity and talent CO IV: To develop global competencies for successful life CO V: To cultivate a value - added life to face challenges and achieve excellence
ਲਾਜ਼ਮੀ ਪੰਜਾਬੀ (PBI-124)	CO1. ਪੁਸਤਕ ਕਾਵਿ-ਧਾਰਾ ਦੇ ਹਵਾਲੇ ਨਾਲ ਸ.ਸ. ਮੀਸ਼ਾ, ਜਸਬੀਰ ਸਿੰਘ ਆਹਲੂਵਾਲੀਆ, ਰਵਿੰਦਰ ਰਵੀ, ਜਗਤਾਰ, ਸੁਰਜੀਤ ਪਾਤਰ, ਪਾਸ਼, ਹਰਿਭਜਨ ਹਲਵਾਰਵੀ, ਮਨਜੀਤ ਟਿਵਾਣਾ ਦੀ ਕਵਿਤਾ ਦੇ ਹਾਵਲੇ ਨਾਲ ਆਧੁਨਿਕ ਪੰਜਾਬੀ ਕਵਿਤਾ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ। CO2. ਪੁਸਤਕ ਕਥਾ-ਰੰਗ ਦੇ ਹਵਾਲੇ ਨਾਲ ਅੱਠ ਕਹਾਣੀਆਂ (ਸ਼ਹੀਦ, ਜਿਊਣ ਜੋਗੇ, ਮੂਨ ਦੀ ਅੱਖ, ਇੱਕੀਵੀਂ ਸਦੀ, ਬਠਲੂ ਚਮਿਆਰ, ਜਿੱਥੋਂ ਸੂਰਜ ਉੱਗਦਾ ਹੈ, ਡੂੰਮ) ਦੇ ਸੰਦਰਭ ਵਿਚ ਪੰਜਾਬੀ ਕਹਾਣੀ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ। CO 3. ਗੁਰਮੁਖੀ ਲਿਪੀ: ਜਨਮ ਅਤੇ ਵਿਕਾਸ, ਗੁਰਮੁਖੀ ਲਿਪੀ ਦੀਆਂ ਵਿਸ਼ੇਸ਼ਤਾਵਾਂ, ਗੁਰਮੁਖੀ ਲਿਪੀ ਦਾ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਨਾਲ ਸੰਬੰਧ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ। CO 4. ਵਿਆਕਰਨਿਕ ਸ਼੍ਰੇਣੀਆਂ: ਲੋੜ, ਮਹੱਤਵ ਅਤੇ ਮੁੱਖ ਸੰਕਲਪ - ਵਚਨ, ਲਿੰਗ, ਪੁਰਖ, ਕਾਲ, ਕਾਰਕ ਸਬੰਧੀ ਸਿਧਾਂਤਕ ਅਤੇ ਵਿਹਾਰਿਕ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ।
ਪੰਜਾਬੀ ਮੱਧਕਾਲੀ-ਕਾਵਿ (PBI-125)	CO 1. ਪੰਜਾਬੀ ਮੱਧਕਾਲੀ ਕਾਵਿ-ਧਾਰਾਵਾਂ (ਗੁਰਮਤਿ, ਸੂਫ਼ੀ ਅਤੇ ਕਿੱਸਾ ਕਾਵਿ) ਬਾਰੇ ਮੁੱਢਲੀ ਜਾਣ-ਪਛਾਣ। CO 2. ਮੱਧਕਾਲੀ ਕਾਵਿ-ਰੂਪਾਕਾਰ: ਸਲੋਕ, ਪਦਾ, ਬਾਰਾਂਮਾਹ, ਕਾਫ਼ੀ ਅਤੇ ਕਿੱਸਾ ਬਾਰੇ ਸਿਧਾਂਤਕ ਜਾਣਕਾਰੀ। CO 3. ਪਾਠ-ਪੁਸਤਕ - ਜਪੁਜੀ ਸਾਹਿਬ (ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਜੀ) : ਵਿਸ਼ਾਗਤ, ਸਿਧਾਂਤਕ ਅਤੇ ਰੂਪਾਕਾਰਕ ਅਧਿਐਨ। CO 4. ਪਾਠ-ਪੁਸਤਕ - ਕਲਾਮ ਬੁੱਲ੍ਹੇ ਸ਼ਾਹ ਵਿਚੋਂ 30 ਕਾਫ਼ੀਆਂ : ਵਿਸ਼ਾਗਤ, ਸਿਧਾਂਤਕ ਅਤੇ ਰੂਪਾਕਾਰਕ ਅਧਿਐਨ।

	CO 5. ਪਾਠ-ਪੁਸਤਕ - ਸੱਸੀ ਪੁੰਨੂੰ (ਹਾਸ਼ਮ ਸ਼ਾਹ) : ਵਿਸ਼ਾਗਤ, ਸਿਧਾਂਤਕ ਅਤੇ ਰੂਪਾਕਾਰਕ ਅਧਿਐਨ।
Course Outcomes	**Outcomes BA (Hum.) Sem. III**
Compulsory English-III (Poetry) ENG-216	CO I: To distinguish between the different varieties of English used all over the world CO II: To enable them to compose and appreciate different types of poetry CO III: To introduce the students to the basic elements of poetry- to enrich the stude through various perspectives readings in poetry CO IV: To analyze poetic texts usi appropriate terms such as diction, tone, imagery, figures of speech, motif, etc. CO To identify and account for distinct literary characteristics of various poe forms.
Functional English-III ENG 217	CO I: To become able to differentiate between judgment and appreciation CO II: To interact confidently in situations like debates and group discussions and seminars CO III: To exercise dramatic and life skills CO IV: To kindle creative mind with innovative thoughts CO V: To know the beauty of the coherence of Language and Literature
ਲਾਜ਼ਮੀ ਪੰਜਾਬੀ (PBI-214)	1. ਪਾਠ-ਪੁਸਤਕ - ਪੰਜਾਬੀ ਕਾਵਿ ਸੰਗ੍ਰਿਹ (1700 ਈ. ਤੱਕ) ਵਿਚੋਂ ਗੁਰਮਤਿ ਕਾਵਿ (ਭਗਤ ਬਾਣੀ+ਗੁਰੂ ਸਾਹਿਬਾਨਾਂ ਦੀ ਬਾਣੀ) ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ। 2. ਇੱਕ ਐਤਵਾਰ, ਜੁੱਤੀਆਂ ਦਾ ਜੋੜਾ, ਨਵਾਂ ਚਾਨਣ, ਡਾਕਟਰ ਪਲਟਾ) ਦੇ ਹਵਾਲੇ ਨਾਲ ਪੰਜਾਬੀ ਨਾਟਕ ਅਤੇ ਇਕਾਂਗੀ ਸਬੰਧੀ ਸੂਝ ਪੈਦਾ ਕਰਨੀ। 3. ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਦਾ ਜਨਮ ਅਤੇ ਵਿਕਾਸ, ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਦੀ ਵਰਤਮਾਨ ਹਾਲਤ (ਸਾਹਿਤ, ਮੀਡੀਆ ਅਤੇ ਵਿੱਦਿਅਕ ਅਦਾਰਿਆਂ ਦੇ ਪ੍ਰਸੰਗ ਵਿਚ) 4. ਧੁਨੀ ਵਿਗਿਆਨ ਅਤੇ ਧੁਨੀ ਵਿਉਂਤ : ਪਰਿਭਾਸ਼ਾ, ਵਰਗੀਕਰਨ ਅਤੇ ਅੰਤਰ-ਨਿਖੇੜ। ਧੁਨੀਆਂ ਦਾ ਵਰਗੀਕਰਨ : ਖੰਡੀ ਅਤੇ ਅਖੰਡੀ ਧੁਨੀਆਂ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ। 5. ਦਫ਼ਤਰੀ ਚਿੱਠੀ-ਪੱਤਰ ਲੇਖਣ ਦਾ ਅਭਿਆਸ ਕਰਵਾਉਣਾ।
ਪੰਜਾਬੀ ਨਾਟਕ ਅਤੇ ਇਕਾਂਗੀ (PBI-215)	1. ਪੰਜਾਬੀ ਨਾਟ- ਰੂਪਾਕਾਰਾਂ ਬਾਰੇ ਜਾਣ-ਪਛਾਣ। 2. ਲੋਕ-ਨਾਟ ਪਰੰਪਰਾ ਬਾਰੇ ਸੰਖੇਪ ਜਾਣਕਾਰੀ। 3. ਪਾਠ ਪੁਸਤਕ : 1960 ਤੋਂ ਪਿਛੋਂ ਦੇ ਇਕਾਂਗੀ ਦਾ ਵਿਸ਼ਾਗਤ ਅਤੇ ਕਲਾਮਈ ਅਧਿਐਨ। 4. ਪਾਠ ਪੁਸਤਕ : ਬਗਾਨੇ ਬੋਹੜ ਦੀ ਛਾਂ ਦਾ ਵਿਸ਼ਾਗਤ ਅਤੇ ਕਲਾਤਮਕ ਅਧਿਐਨ। 5. ਪਾਠ ਪੁਸਤਕ : ਮੁਇਆਂ ਸਾਰ ਨ ਕਾਈ ਦਾ ਵਿਸ਼ਾਗਤ ਅਤੇ ਕਲਾਤਮਿਕ ਅਧਿਐਨ।
Course Outcomes	**Outcomes BA (Hum.) Sem. IV**
Compulsory English-IV (Short Stories) ENG 226	CO I: To equip them to attempt practical criticism of plays, passages and poems CO II: To read and appreciate stories on their own. CO III: To develop a comparative perspective to study the texts CO IV: To recognise and discuss the aspects of an author. CO V: To demonstrate an awareness of cultural and intercultural concerns relating to that author.
Functional English-IV ENG 227	CO I: To lead to a greater understanding of the human communicative action through an objective study of language

	CO II: To familiarize students with the key concepts of English and develop awareness of the latest trends in language study CO III: To help students move towards better and intelligible pronunciation and to improve the general standard of pronunciation in everyday conversation. CO IV: To demonstrate the awareness of evolution theory of language by varied culture CO V: To study the formation of new words
Punjabi Lazmi (PBI-224)	CO I: ਪਾਠ-ਪੁਸਤਕ - ਪੰਜਾਬੀ ਕਾਵਿ ਸੰਗ੍ਰਿਹ (1700 ਈ. ਤੱਕ) ਵਿਚੋਂ ਸੂਫ਼ੀ ਕਾਵਿ ਅਤੇ ਕਿੱਸਾ ਕਾਵਿ (ਸ਼ਾਹ ਹੁਸੈਨ ਦੀਆਂ ਕਾਫ਼ੀਆਂ+ਹੀਰ ਦਮੋਦਰ) ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ। CO II: ਪਾਠ-ਪੁਸਤਕ - ਮੰਚ ਦਰਸ਼ਨ ਵਿਚੋਂ ਅਗਲੀਆਂ ਪੰਜ ਇਕਾਂਗੀਆਂ (ਗਊਮੁਖਾ-ਸ਼ੇਰਮੁਖਾ, ਜ਼ੈਲਦਾਰ, ਇਕ ਵਿਚਾਰੀ ਮਾਂ, ਅੰਨ੍ਹੇ ਨਿਸ਼ਾਨਚੀ, ਚਾਬੀਆਂ) ਦੇ ਆਧਾਰ 'ਤੇ ਪੰਜਾਬੀ ਇਕਾਂਗੀ ਬਾਰੇ ਸਮਝ-ਸੂਝ ਪੈਦਾ ਕਰਨੀ। CO III: ਸ਼ਬਦ ਵਿਗਿਆਨ : ਪਰਿਭਾਸ਼ਾ, ਬਣਤਰ ਅਤੇ ਰਚਨਾ; ਪੰਜਾਬੀ ਭਾਵੰਸ਼ ਵਿਉਂਤ : ਪਰਿਭਾਸ਼ਾ ਅਤੇ ਵਰਗੀਕਰਨ। CO IV: ਪੰਜਾਬੀ ਸ਼ਬਦ ਜੋੜਾਂ ਦੇ ਨਿਯਮ ਅਤੇ ਸਮੱਸਿਆਵਾਂ। CO V: ਇਸ਼ਿਤਿਹਾਰ, ਪ੍ਰੈੱਸ ਨੋਟ ਅਤੇ ਖ਼ਬਰਾਂ : ਲਿਖਣ ਦੀਆਂ ਵਿਧੀਆਂ ਅਤੇ ਨੇਮਾਂ ਬਾਰੇ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ।
ਪੰਜਾਬੀ ਗਲਪ (PBI-225)	1. ਸਾਹਿਤ ਰੂਪਾਕਾਰ : ਨਾਵਲ ਤੇ ਕਹਾਣੀ ਬਾਰੇ ਸਿਧਾਂਤਕ ਜਾਣ-ਪਛਾਣ। 2. ਪੰਜਾਬੀ ਗਲਪ ਦੇ ਇਤਿਹਾਸ ਬਾਰੇ ਮੁੱਢਲੀ ਜਾਣਕਾਰੀ। 3. ਪਾਠ ਪੁਸਤਕ – ਦੁਆਦਸ਼ੀ ਵਿਚਲੀਆਂ ਕਹਾਣੀਆਂ ਦਾ ਥੀਮਕ ਅਤੇ ਕਲਾਤਮਕ ਅਧਿਐਨ। 4. ਪਾਠ ਪੁਸਤਕ – ਕਥਾ-ਸੰਸਾਰ (1960 ਤੋਂ ਪਿੱਛੋਂ ਦੀ ਪੰਜਾਬੀ ਕਹਾਣੀ ਦਾ ਸੰਗ੍ਰਹਿ) ਦਾ ਵਿਸ਼ਾਗਤ ਅਤੇ ਕਲਾਤਮਕ ਅਧਿਐਨ। 5. ਪਾਠ-ਪੁਸਤਕ – ਬਾਬਾ ਤੇਗਾ ਸਿੰਘ (ਨਾਵਲ) ਦਾ ਥੀਮਿਕ ਅਤੇ ਵਿਸ਼ਾਗਤ ਅਧਿਐਨ।
Course Outcomes	**Outcomes BA (Hum.) Sem. V**
Compulsory English-V (Studies in Drama) ENG 316	CO I: On completion of the course, the students should be familiar with the plays of master- dramatists and will have developed the ability to appreciate and evaluate various types of plays CO II: To identify the distinct literary genres of the tragedies, comedies, and histories present in plays CO III: To enact the scenes without hesitation. CO IV: To identify the main ideas, details and speakers' attitudes and emotions by listening to different types of spoken texts. CO V: To speak intelligibly (pronunciation, stress, intonation)
Punjabi Lazmi (PBI-314)	CO I:ਨਾਵਲ : ਸੁੰਦਰੀ (ਭਾਈ ਵੀਰ ਸਿੰਘ) ਦਾ ਪਾਠਗਤ ਅਤੇ ਵਿਸ਼ਾਗਤ ਅਧਿਐਨ ਕਰਵਾਉਣਾ। CO II:ਪਾਠ-ਪੁਸਤਕ - ਵਾਤਾਵਰਨ ਚੇਤਨਾ ਵਿਚਲੇ ਲੇਖਾਂ ਦੇ ਆਧਾਰ ''ਤੇ ਵਿਦਿਆਰਥੀਆਂ ਵਿਚ ਵਾਤਾਵਰਨ ਚੇਤਨਾ ਪੈਦਾ ਕਰਨੀ। CO III:ਵਾਕ-ਵਿਉਂਤ: ਪਰਿਭਾਸ਼ਾ ਅਤੇ ਵਰਗੀਕਰਨ; ਰੂਪ ਦੇ ਆਧਾਰ 'ਤੇ ਵਾਕ ਵੰਡ- ਸਧਾਰਨ, ਸੰਯੁਕਤ, ਮਿਸ਼ਰਤ। ਕਾਰਜ ਦੇ ਅਧਾਰ ਤੇ ਵਾਕ ਵੰਡ- ਬਿਆਨੀਆ, ਸਵਾਲੀਆ ਅਤੇ ਹੁਕਮੀ ਵਾਕ।

	CO IV:ਸੰਚਾਰ: ਪਰਿਭਾਸ਼ਾ ਅਤੇ ਵਰਗੀਕਰਨ, ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਦੇ ਸੰਚਾਰ ਸਾਧਨ: ਪ੍ਰਿੰਟ ਅਤੇ ਬਿਜਲਈ ਮੀਡੀਆ (ਅਖ਼ਬਾਰ, ਰਸਾਲੇ, ਰੇਡੀਓ, ਟੈਲੀਵਿਜਨ, ਕੰਪਿਊਟਰ ਅਤੇ ਇੰਟਰਨੈੱਟ ਦਾ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਲਈ ਯੋਗਦਾਨ) CO V:ਕਿਸੇ ਅਣਡਿੱਠੇ ਪੈਰੇ ਦਾ ਢੁੱਕਵਾਂ ਸਿਰਲੇਖ ਅਤੇ ਸੰਖੇਪ-ਰਚਨਾ ਅਭਿਆਸ ਕਰਵਾਉਣਾ।
ਆਧੁਨਿਕ ਪੰਜਾਬੀ ਕਵਿਤਾ **(PBI-315)**	1. ਆਧੁਨਿਕ ਪੰਜਾਬੀ ਕਾਵਿ-ਰੂਪਾਕਾਰ: ਜਾਣ-ਪਛਾਣ (ਰੁਬਾਈ, ਖੁੱਲ੍ਹੀ ਕਵਿਤਾ, ਗੀਤ, ਗ਼ਜ਼ਲ) 2. ਆਧੁਨਿਕ ਪੰਜਾਬੀ ਕਾਵਿ ਦੇ ਮੁੱਖ ਰੁਝਾਨਾਂ ਬਾਰੇ ਜਾਣਕਾਰੀ। 3. ਪਾਠ ਪੁਸਤਕ : ਸੁਖਨ ਦੇ ਸੂਰਜ 4. ਪਾਠ ਪੁਸਤਕ : ਕਾਵਿ-ਜੋਤਿ 5. ਪਾਠ ਪੁਸਤਕ : ਸਮਕਾਲੀ ਪੰਜਾਬੀ ਕਵਿਤਾ
ਪੰਜਾਬੀ ਵਾਰਤਕ (PBI-316)	1. ਵਾਰਤਕ ਰੂਪਾਕਾਰਾਂ ਸਾਖੀ, ਸਵੈ-ਜੀਵਨੀ, ਨਿਬੰਧ ਅਤੇ ਸਫ਼ਰਨਾਮਾ ਬਾਰੇ ਜਾਣਕਾਰੀ। 2. ਪਾਠ-ਪੁਸਤਕ : ਪੁਰਾਤਨ ਜਨਮ ਸਾਖੀ ਵਿਚੋਂ ਚਾਰ ਉਦਾਸੀਆਂ (ਸੰਪਾ. ਭਾਈ ਵੀਰ ਸਿੰਘ) 3. ਪਾਠ-ਪੁਸਤਕ : ਪੰਜਾਬੀ ਵਾਰਤਕੀ 4. ਪਾਠ-ਪੁਸਤਕ : ਖੁੱਲ੍ਹੇ ਲੇਖ
ਪੰਜਾਬੀ ਅਤੇ ਸਮਾਜਕੀ ਵਿਗਿਆਨ (PBI-317)	1. ਭਾਸ਼ਾ ਦੀ ਪ੍ਰਕਿਰਤੀ, ਵਿਕਾਸ, ਮਹੱਤਤਾ ਅਤੇ ਲੋੜ 2. ਭਾਸ਼ਾ ਦਾ ਧਰਮ, ਇਤਿਹਾਸ, ਸਭਿਆਚਾਰ ਅਤੇ ਮਨੋਵਿਗਿਆਨ ਨਾਲ ਸਬੰਧ 3. ਸਮਾਜੀ ਭਾਸ਼ਾ ਵਿਗਿਆਨ, ਪੰਜਾਬੀ ਉਪਭਾਸ਼ਾਵਾਂ ਦੇ ਪਛਾਣ-ਚਿੰਨ੍ਹ 4. ਮਾਂ-ਬੋਲੀ ਦਾ ਮਹੱਤਵ, ਰਾਜ ਭਾਸ਼ਾ ਅਤੇ ਕੌਮੀ ਭਾਸ਼ਾ 5. ਭਾਸ਼ਾ ਅਤੇ ਸਿੱਖਿਆ ਪ੍ਰਬੰਧ, ਬੱਚੇ ਦਾ ਮਾਨਸਿਕ ਵਿਕਾਸ ਅਤੇ ਭਾਸ਼ਾ, ਬੱਚੇ ਦਾ ਸਮਾਜੀਕਰਣ 6. ਭਾਸ਼ਾ, ਨਸਲ ਅਤੇ ਕੌਮੀਅਤ
Course Outcomes	**Outcomes BA (Hum.) Sem.VI**
Compulsory English-VI (Introduction to Fiction and Non-Fiction) **ENG 326**	CO I: To develop critical thinking and imagination through long and short fiction and to familiarize students with cultural diversity through different representative samples of fiction CO II: To expose the different genres to acquire knowledge and apply that in the creative writing. CO III: To acquire a broad perspective of the novel as a literary genre and the relevant historical, geographical, and cultural identical backgrounds. CO IV: To analyze various types of novels with reference to thematic and other approaches CO V: Appreciate the working of various literary devices like irony in fiction
Punjabi Lazmi (PBI-324)	CO I: ਪਾਠ-ਪੁਸਤਕ - ਯਾਦਾਂ ਦੀ ਕੰਨੀ ਦੇ ਆਧਾਰ 'ਤੇ ਵਾਰਤਕ ਸਬੰਧੀ ਸਮਝ-ਸੂਝ ਪੈਦਾ ਕਰਨੀ। CO II: ਪਾਠ-ਪੁਸਤਕ - ਵਾਰਤਕ ਵਿਵੇਕ ਦੇ ਆਧਾਰ 'ਤੇ ਆਧੁਨਿਕ ਵਾਰਤਕ ਦੇ ਵਿਸ਼ਾ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ। CO III: ਭਾਸ਼ਾ-ਵਿਗਿਆਨਕ ਸ਼ਬਦਾਵਲੀ: ਦੁਭਾਸ਼ਾਵਾਦ, ਬਹੁਭਾਸ਼ਾਵਾਦ, ਮਾਂ-ਬੋਲੀ, ਦੂਜੀ ਭਾਸ਼ਾ, ਸਰਕਾਰੀ ਭਾਸ਼ਾ।

	CO IV: ਅਰਥ-ਵਿਗਿਆਨ: ਪਰਿਭਾਸ਼ਾ ਅਤੇ ਲੋੜ, ਅਰਥ ਵਿਸਤਾਰ ਅਤੇ ਸੰਕੋਚ, ਅਰਥ ਉਤਰਾਅ ਅਤੇ ਚੜ੍ਹਾਅ CO V: ਪੈਰਾ ਅਨੁਵਾਦ: ਅੰਗਰੇਜ਼ੀ ਤੋਂ ਪੰਜਾਬੀ (ਪੈਰਾ ਲਗਭਗ 100-125 ਸ਼ਬਦਾਂ ਦਾ ਹੋਵੇ)ਅਭਿਆਸ ਕਰਵਾਉਣਾ।
ਪੰਜਾਬੀ ਲੋਕਧਾਰਾ, ਭਾਸ਼ਾ ਅਤੇ ਸਭਿਆਚਾਰ (PBI-325)	1. ਲੋਕਧਾਰਾ : ਸਿਧਾਂਤਕ ਜਾਣ-ਪਛਾਣ 2. ਪਾਠ ਪੁਸਤਕ : ਲੋਕਧਾਰਾ ਦੀ ਭੂਮਿਕਾ 3. ਸਭਿਆਚਾਰ : ਸਿਧਾਂਤਕ ਜਾਣ-ਪਛਾਣ 4. ਪਾਠ-ਪੁਸਤਕ : ਸਭਿਆਚਾਰ ਤੇ ਵਿਚਾਰ 5. ਭਾਸ਼ਾ : ਪਰਿਭਾਸ਼ਾ, ਪ੍ਰਕਿਰਤੀ ਅਤੇ ਵਿਸ਼ੇਸ਼ਤਾਵਾਂ। 6. ਭਾਸ਼ਾ ਵਿਗਿਆਨ: ਪਰਿਭਾਸ਼ਾ ਅਤੇ ਵਰਗੀਕਰਨ (ਧੁਨੀ ਵਿਗਿਆਨ, ਸ਼ਬਦ ਵਿਗਿਆਨ, ਵਾਕ ਵਿਗਿਆਨ, ਅਰਥ ਵਿਗਿਆਨ ਬਾਰੇ ਮੁੱਢਲੀ ਜਾਣਕਾਰੀ)
ਪੰਜਾਬੀ ਵਿਆਕਰਣ ਅਤੇ ਭਾਸ਼ਾ ਵਿਗਿਆਨ (PBI-326)	1. ਪੰਜਾਬੀ ਵਿਆਕਰਣ ਬਾਰੇ ਸਿਧਾਂਤਕ ਜਾਣਕਾਰੀ 2. ਗੁਰਬਾਣੀ ਵਿਆਕਰਣ ਬਾਰੇ ਸਿਧਾਂਤਕ ਜਾਣਕਾਰੀ 3. ਪੰਜਾਬੀ ਵਿਚ ਨਵੇਂ ਭਾਸ਼ਾ ਵਿਗਿਆਨਕ ਸੰਕਲਪ : ਜਾਣ-ਪਛਾਣ 4. ਪੰਜਾਬੀ ਦੀ ਧੁਨੀ ਵਿਉਂਤ ਅਤੇ ਸ਼ਬਦ ਵਿਉਂਤ 5. ਪੰਜਾਬੀ ਦੀ ਵਾਕੰਸ਼ ਅਤੇ ਵਾਕ ਵਿਉਂਤ 6. ਅਰਥ-ਵਿਗਿਆਨ ਅਤੇ ਪੰਜਾਬੀ ਅਰਥ ਵਿਉਂਤ
ਭਾਸ਼ਾਈ ਅਧਿਆਪਨ ਅਤੇ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਦੀ ਸਿਖਲਾਈ (PBI-327)	1. ਭਾਸ਼ਾ ਸਿੱਖਣ ਦੇ ਸਿਧਾਂਤ ਅਤੇ ਨਿਯਮ 2. ਬੱਚੇ ਦੇ ਸਿੱਖਣ ਵਿਚ ਮਾਂ-ਬੋਲੀ ਦੀ ਭੂਮਿਕਾ 3. ਦੂਜੀ ਬੋਲੀ ਸਿੱਖਣ ਦੇ ਸਿਧਾਂਤ ਅਤੇ ਨਿਯਮ 4. ਪੰਜਾਬੀ ਅਧਿਆਪਨ ਦੇ ਟੀਚੇ ਅਤੇ ਉਦੇਸ਼ 5. ਭਾਸ਼ਾਈ ਗਤੀਵਿਧੀਆਂ : ਜਾਣ-ਪਛਾਣ ਕਰਨੀ, ਭਾਸ਼ਣ ਵਿਧੀ, ਬਹਿਸ ਵਿਧੀ, ਕਹਾਣੀ ਵਿਧੀ 6. ਅਧਿਆਪਨ ਵਿਧੀਆਂ : ਪ੍ਰਾਜੈਕਟ ਵਿਧੀ, ਖੇਡ ਵਿਧੀ, ਵਿਚਾਰ-ਵਟਾਂਦਰਾ ਵਿਧੀ, ਪੜਚੋਲ ਵਿਧੀ

Programme: B.LIB.I.SC (One Year degree programme)

PROGRAMME OUTCOMES (POs)

PO1: Understand about libraries and librarianship.

PO 2: Get acquainted with various standards and tools being used in processing, managing and retrieving information resources.

PO 3: Ability to manage information traditionally as well as in modern ways.

PO 4: Apply skills in carrying out professional activities such as (i) acquisition, accessioning, classification, cataloguing, and physical processing of documents; (ii) housekeeping operations using library management software and Information and Communication Technologies;(iii) maintaining library collection and; (iv) educating users

PROGRAMME SPECIFIC OBJECTIVES (PSOs)

PSO 1: Students will be coping with the increasing demand for higher education and trained human resources in the field of Library & Information Science.

PSO 2: students will be able to understand the values and principles of the field and its specialisations with an awareness of overarching social responsibility associated with progressive public service for the public good.

PSO 3 students will find the opportunities to develop cutting-edge technological skills and competences used across the information professions.

PSO 4 students will also acquire practical skills to work as Cataloguer and classifier

PSO 5 Students will have competencies to perform day to day housekeeping operations and provide library services such as circulation, reference and information services to users of a library

COURSE	COURSE OUTCOMES (COs)
B.LIB.I.SC 1st Se	
LIS101:FOUNDATION OF LIBRARY AND INFORMATION SCIENCE	**CO1:** Understand about basic philosophy of library and information science **CO2:** To know the role of library as a social institute **CO3:** To know about the Role of library associations and institutions at international level: UNESCO and IFLA **CO4:** To know about the Resources sharing via networking

LIS102: KNOWLEDGE ORGANISATION AND INFORMATION PROCESSING: THEORY	**CO1: L**earn about the theory of library classification and cataloguing. **CO2: L**earn how to help scholars locate books and other resources. **CO3: know about the** Historical development of library classification schemes
LIS103: KNOWLEDGE ORGANISATION AND INFORMATION PROCESSING: CLASSIFICATION PRACTICE DD& DDC	**CO1:** Understand Dewey Decimal Classification and Colon Classification schemes Get skills to use National and International Classification schemes. **CO2:** Learn practice in the techniques of classifying titles of documents according to Dewey Decimal Classification and Colon Classification.
LIS104: KNOWLEDGE ORGANISATION AND INFORMATION PROCESSING: CATALOGUING PRACTICE* CCC & AACRII	**CO1:** Learn the techniques of cataloguing documents according to Classified Catalogue Code (CCC) and Anglo American Cataloguing Rules (AACR II).
B.LIB.I.SC 2nd Semester	
LIS105: MANAGEMENT OF LIBRARIES AND INFORMATION CENTRES	**CO1:** Learn organizing and managing library and information centres while applying principles, techniques and functions of management. **CO2:** Learn routine housekeeping functions of a library.
LIS106: INFORMATION SOURCES AND SERVICES	**CO1:** To impart the knowledge regarding basic reference and information sources. **CO2:** Learn ability in answering queries of users.
LIS107: INFORMATION AND COMMUNICATION TECHNOLOGY: BASICS	**CO1:** Develop the skills of Computers, computer architecture, the System Software and application software, and use of Communication Technology in Libraries.
LIS108: LIBRARY AND ITS USERS	**CO1**: Understand the different categories of users and their information needs **CO2:** Understand the types of Information Systems and information Services.
LIS109: SCHOOL LIBRARY SYSTEM	**CO1**: Understand the role of School library in Elementary and Secondary Education

	CO2: Learn about the sources and services provided by school library.

M.Sc. Psychology

PROGRAMME OUTCOMES

- Advanced knowledge regarding key theories and methods in psychology.
- In-depth understanding of application of Psychological principles in different behavioural contexts.
- Knowledge and use of research methods and statistics in psychology.
- Ability to appraise the efficacy of different interventions to promote psychological well- being and performance.
- Translation of theory into professional practice and applied research.
- Application of psychological research methods to a novel research topic.
- Planning and execution of an original piece of research.
- Ability to identify and address ethical and professional issues in psychology.
- Developing professional attitude and expertise in the field of psychology.
- Development of independent and flexible approach to effective learning.

PROGRAMME SPECIFIC OUTCOMES

- Student will be able to explain various theories and utilization of their principles in day to life activities
- Student will be able conduct research on different issues
- Students will be able to apply the statistical analysis to study the research issues
- Student will be able to provide psychological interventions by learning the principles of counselling and health psychology
- Students will be able to develop a professional aptitude in their behavioral outcomes

COURSE OUTCOMES

Semester	Course Code	Course Title	L	T	P	C
I	**PSYM 501**	**Principles of Psychology**	**4**	**0**	**0**	**4**

- Develop a working knowledge of Psychological contents, areas and applications of psychology.
- Develop a base in cognitive psychology with the help of relevant examples of everyday life.
- Comprehend and analyse situations in real life appropriately and enable others to exercise in the same way.
- Appreciate and apply various theories of learning in the practical world.
- Identify the importance of experiments in the field of memory and other cognitive aspects and analyse the way it shaped cognitive psychology

PSYM 502	**Psychology of Life Span Development**	**4**	**0**	**0**	**4**

Course Objectives and Learning Outcomes: At the end of the course, students will be able to:

- Understand basic concepts, issues and debates in the field of developmental psychology.
- Appreciate principal theories of lifespan development.
- Comprehend human development as progressing through different stages.

- Discuss development from the perspective of different domains such as physical, motor, cognitive, and psychosocial.
- Understand the role of family, peers and community in influencing development at
- different stages.

PSYM 503	**Research Methods in Psychology**	**4**	**0**	**0**	**4**

Course Objectives and Learning Outcomes: At the end of the course, students will be able to:

- On completion of the course the student will be able to understand, participate and conduct various steps involved in research.
- Differential understanding of appropriate techniques to be used in various types of scientific research in social sciences.
- Analyse & comprehend research and its application.
- Design and Develop the strategy, to conduct research.
- Comprehend the inter relation between parameters under study.
- Develop insight into procedural scientific steps of conducting a research.

PSYM 504	**Advanced Social Psychology**	**4**	**0**	**0**	**4**

Course Objectives and Learning Outcomes: At the end of the course, students will be able to:

- Develop insight and analyze the contribution of social psychologists to the understanding of human society.
- Evaluate effective strategies in socialization, group processes (both inter and intra-group) and helping behavior.
- Ability to register the progression of theories in major areas in Social Psychology.
- Interpret attitude formation and various methods to be used to change the attitude.
- Understand aspects related to social psychology

PSYM 505	**Practicum 1**	**0**	**0**	**2**	**2**

Course Objectives and Learning Outcomes: At the end of the course, students will be able to:

- Ability to administer, analyze and interpret results from various psychological tools.
- Expanded knowledge of various assessment procedures
- Learning regarding conduction of experiments

Semester	Course Code	Course Title	L	T	P	C
II	**PSYM 521**	**Cognitive Psychology**	**4**	**0**	**0**	**4**

Course Objectives and Learning Outcomes: At the end of the course, students will be able to:

- Getting theoretically and practically focused on concepts of attention, perception, memory, learning, thinking, concept formation, language formation.
- Analyze each situation rationally and take decisions better and faster than others.
- Comprehend the role of mental processing in day -to- day life for solving problems.
- Identify the building blocks that enable students to identify their strengths and weaknesses so that they can further help others in doing so
- Cultivate cognitive skills to understand the mind and behavior.
- Explore and comprehend the concepts, principles and themes of cognitive psychology.
- Facilitate the students to develop the cognitive skills in themselves and others.

PSYM 522	**Personality Psychology**	**4**	**0**	**0**	**4**

Course Objectives and Learning Outcomes: At the end of the course, students will be able to:

- Illustrate various theories of personality.
- Develop capability to apply knowledge of personality theories for self and societal growth
- It enables students to become familiar with the major theories and traditions related to the study of personality and personal growth.
- It further enables the student to articulate the underlined themes, methodology and assumption of each theory to enhance understanding of personality and behaviour.

PSYM 523	**Counselling and Guidance**	**4**	**0**	**0**	**4**

Course Objectives and Learning Outcomes: At the end of the course, students will be able to:

- Evaluate various psychotherapies and schools in counselling techniques.
- Develop skills of eclectic therapeutic plans.
- Identify the techniques to practice in the therapy encounter and how those techniques should be implemented with a variety of disorders and psychosocial issues

PSYM 524	**Qualitative Research methods**	**4**	**0**	**0**	**4**

Course Objectives and Learning Outcomes: At the end of the course, students will be able to:

- To enable students to understand the concepts and methodology for its application in research work and human behaviour.
- Students will be able to apply psychometric methods in psychological testing.

PSYM 525	**Practicum 2**	**0**	**0**	**2**	**2**

Course Objectives and Learning Outcomes: At the end of the course, students will be able to:

- Ability to administer, analyse and interpret results from various psychological tools.
- Expand knowledge of various assessment procedures
- Knowledge of the ways to interpret the scores obtained through experiments and learn to discover the difference in between experimental and non- experimental set-up

Semester	Course Code	Course Title	L	T	P	C
III	**PSYM 601**	Organizational Behavior, Development and Change	4	0	0	4

Course Objectives and Learning Outcomes: At the end of the course, students will be able to:

- Students will be able to describe concepts of psychology in the process of manpower training.
- Design training & development process of an organizations,
  apply various methods in organizational setting
- The goal of this course is to understand how psychological principal improve efficiency and quality of employee life
- Students gain knowledge about the history of I/O psychology, job analysis, motivation, leadership, job satisfaction, work stress and health.

PSYM 602	**Clinical Psychology**			

Course Objectives and Learning Outcomes: At the end of the course, students will be able to:

- Express the nature and scope of clinical psychology and its linkages to other fields of healthcare and management

- Analyze the current state of clinical psychology in India vis-à-vis the west
- Develop insight various categories of psychological disorders with an emphasis on diagnosis and prognosis
- Illustrate and analyze the ethical issues in clinical practice.
- Identify and inculcate the skills to become a professional in the field of clinical psychology
- Provide students with opportunities to apply the concepts learnt in the class-room to real-life situations
- Enable students to understand Research and its importance in experiential learning through Case study.

PSYM 603	**Quantitative Techniques for Psychology**			

Course Objectives and Learning Outcomes: At the end of the course, students will be able to:

- Analyse the basic concepts of statistics in psychology
- Description and communication of data through advanced methods
- Explore parametric and non- parametric statistical tools for analysis and interpretation
- Illustrate hypothesis testing by use of inferential tools
- Apply qualitative data analysis for in depth explorations

PSYM 604	**Neuropsychology**			

Course Objectives and Learning Outcomes: At the end of the course, students will be able to:

- Describe the nature and basic principles of neuropsychology.
- Identify the brain's levels and structures and summarize the functions of its parts.
- Plan and Execute assessments and rehabilitation for individuals with neurocognitive dysfunctions
- Understand the complexities associated with the nervous system and its command centre – the brain.
- To equip students with skills to consider and rule out a neuropsychological origin of the psychopathology

PSYM 606	**Practicum 3**	0	0	2	2

Course Objectives and Learning Outcomes: At the end of the course, students will be able to:

- Ability to administer, analyse and interpret results from various psychological tests i.e. personality, intelligence sociometric data etc.
- Expanded knowledge of various assessment procedures
- Also make them learn to qualitatively and quantitatively analyse the data and interpret the scores obtained.
- Enables students to learn the importance of psychological testing and the types of tests used.

Semester	Course Code	Course Title	L	T	P	C
IV	**PSYM 621**	Indigenous Psychology	4	0	0	4

Course Objectives and Learning Outcomes: At the end of the course, students will be able to:

- Review historical components as it relates to the current health and wellbeing of Indigenous people.
- Understand the unique challenges faced by Indigenous populations in achieving equitable outcomes.
- Gain an improved level of cultural competency and reflexivity in working with Indigenous people.
- Understand how psychological research can inform practice with Indigenous people.

PSYM 622	**Health Psychology**	**4**	**0**	**0**	**4**

Course Objectives and Learning Outcomes: At the end of the course, students will be able to:

- Analyzing Historical perspective on Health & Illness
- Introduction on how theoretical and empirical findings are applied to improve the lives and development of individuals and groups with the help of health psychology.
- Analyze and critically evaluating fundamental issues, with a particular focus on how to promote health across a range of settings this course will be relevant for students who want to work in health settings.
- The course will provide an insight into how psychology can be used to understand important health issues for example – patient adjustment to chronic illness, how to motivate patients to change their health-related behaviour or how lifespan influences shape our health beliefs and behaviours, arguments, and points of view in health psychology

PSYM 624	**Therapeutic Techniques**	**4**	**0**	**0**	**4**

Course Objectives and Learning Outcomes: At the end of the course, students will be able to:

- Analyze and apply their understanding of psychological testing.
- Interpret and assess the role of psychological testing in various settings.
- Effectively synthesize and apply the variations in scales and tests.
- Recognize the various types of psychological tests
- Organize the various steps in construction of a psychological test
- Review the ethical issues surrounding psychometric evaluation in day to day life
- On completion of this course the student should be able to appraise testing in psychology.
- Apply psychological testing, and various tests to assess intelligence and personality.
- Demonstrate ways to measure personality and various scales and tests that are used for the purpose.

Programme: M.A. Education (Two-Year degree programme)

PROGRAM OUTCOMES (POs)

PO1: Professional Capacity Building: Apply the knowledge of Philosophy, Sociology, Psychology Educational Measurement &Evaluation, Educational Administration & Management in the field of teaching profession, research and extension work in the field of education in general.

PO2: Academic Integrity and Professional Ethics: Demonstrate academic integrity and professional ethics by keeping self-abiding to rules, regulations, values and high standards in teaching, research, and administration at diversified educational setting and Teacher Education Institutes.

PO3: Resilience and cope up with Complex issues: Demonstrate spirit of work in diversified situations and apply knowledge & skills to cope up educational issues in complex situations with appropriate consideration for the rules, norms and the Social, cultural, and environmental context.

PO4: Academic Administration and Management Capacities: Apply the knowledge of Educational administration & management and other allied subjects like Philosophy, Sociology, Psychology etc. in academic planning, organization, evaluation, decision making, resource management according to predetermined goals, norms and standards.

PO5: Continuous Academic Development: Identify own educational needs and requirements, keep academic development and learning in an independent way in the context of change in different aspects of education and teacher education.

PO6: Commitment towards Society and National Goals: Recognize areas of commitment, accountability, constitutional values, and national goals and perform accordingly.

PO7: Sensitivity for Emerging Issues: Apply the knowledge & skills to deal with Issues related to population, environment, gender equality, emotional problems, literacy levels etc. and respond to emerging issues by applying critical, constructive and creative thought process.

PO8: Research and Knowledge Creation: Involve in knowledge dissemination, knowledge creation, research and innovative educational practices related to different stakeholders of education.

PO9: Independent and Team Work Capacities: Perform Function effectively either in the role of member or leader in diversified educational settings and Institutions of Teacher Education.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO 1: To build perspective and understanding of concepts, theories, ideas and practices across various fields of Education.

PSO 2: To understand the historical, political and economic aspect of education.

PSO 3: To provide research related experiences with the competency to independently develop dissertation and research work.

PSO 4: To interpret the schools of philosophy and their educational significance.

PSO 5: To get an insight into Curriculum development, various educational policies and practices.

PSO 6: To enable proper understanding and critical perspective about specialized areas of Education.

PSO 7: To enable the students to acquire Data Analysis Skills.

Course	Course Outcomes (COs)
M.A. Education 1st Semester	
PHILOSOPHICAL AND SOCIOLOGICAL FOUNDATIONS OF EDUCATION-I (EDU-430)	**CO 1:** Understand and explain the nature and functions of educational philosophy. **CO 1:** Comprehend the impact of Indian Schools of Philosophy on the educational processes. **CO 1:** Elaborate the relationship of education and social change. **CO 1:** Understand and explain the intimate relationship between education and sociology.
EDUCATIONAL PSYCHOLOGY-I (EDU-431)	**CO 1:** Acquire knowledge of basic concept of educational psychology. **CO 2:** Understand individual differences among learners. **CO 3:** Gain knowledge of methods of Educational Psychology and recent trends. **CO 4:** Understand adolescent's growth, development and their problems. **CO 5:** Analyze the learning process based on theoretical approaches of learning.
EDUCATIONAL RESEARCH & STATISTICS (EDU-432)	**CO 1:** Define research problem. **CO 2:** Formulate a hypothesis. **CO 3:** Select a sample and forward reasons in support of his/her decisions. **CO 4:** Understand the meaning and importance of statistics. **CO 5:** Understand the meaning and compute measures of central tendency, measures of variability, and measures of relationship. **CO 6:** Understand the meaning and application of normal probability curve. **CO 7:** Select and conduct the statistical analysis of data by applying the statistics suitable for the problem
GUIDANCE & COUNSELING-I (EDU-433)	**CO 1:** Explain the concept, aims, principles and types of guidance. **CO 2:** Describe the nature of guidance programme. **CO 3:** Understand the purpose of services of guidance. **CO 4 :**Understand the roles of various guidance personnel
SPECIAL EDUCATION-I (OPTIONAL) (EDU-434|)	**CO 1:** Explain nature and causes of exceptionality. **CO 2:** Suggest the alternative or remedial educational provisions for special children. **CO 3:** Understand concept of mental retardation and provisions for them. **CO 4:** Understand the process of practical assessment of special children.
EDUCATIONAL MEASUREMENT AND EVALUATION-I (OPTIONAL)	**CO 1:** Explain the concepts and techniques of measurement and evaluation. **CO 2:** Develop skills in the construction and standardization of tests.

(EDU-435)	**CO 3:** Explain the applications of advanced statistical techniques.
EDUCATIONAL ADMINISTRATION AND MANAGEMENT-I (OPTIONAL) (EDU-436)	**CO 1:** Explain concepts of administration and management. **CO 2:** Apply these concepts in management of education systems. **CO 3:** Describe the different administrative structures for different levels of education. **CO 4:** Explain the role of national, state and local level bodies responsible for educational administrations.
	M.A. Education 2nd Semester
PHILOSOPHICAL AND SOCIOLOGICAL FOUNDATIONS OF EDUCATION-II (EDU-437)	**CO 1**: To reflect upon the thoughts of Indian and Western thinkers on education and explore the implications of the concepts involved in educational practices. **CO 2:** To promote reflective thinking through philosophy. **CO 3:** To correlate sociology and education. **CO4:** To establish the relevancy of philosophical theories in modern education system. **CO 5:** To interpret the role of education in social context. **CO 6:** Connect theory to real world information and practice Develop an ability to employ aspects of philosophical analysis and reasoning, as well as critical thinking skills, in the context of writing about the philosophy of education; **CO7**: To inculcate sensitivity and values in education**.** **CO8**: To develop vision for future of Indian Education system.
EDUCATIONALPSYCHOLOGY -II (EDU-438)	**CO 1:**Gain knowledge about the concept and theories of personality and its Assessment **CO 2:**Understand and measure the learner's cognitive abilities with special reference to intelligence **CO3:**Differentiate between characteristics of adjusted and maladjusted learners **CO 4:** Understand learner in Psycho-social context. **CO 4:**Get acquainted with concept and nature of children with special needs
EDUCATIONAL RESEARCH & STATISTICS-II (EDU-439)	**CO 1:** Select the tools for studying different variables. **CO 2:** Understand historical, descriptive and experimental method of research. **CO 3:** Select/ formulate the design of the study by controlling and classifying the variables demanded by the design. **CO 4:**understand the meaning and compute ANOVA, Chi square **CO 5:** Report the research work in accordance with the current trends and procedures of report writing. **CO6:** Select and conduct the statistical analysis of the data by applying the statistics suitable for the problem.
GUIDANCE AND COUNSELLING-II (OPTIONAL) (EDU-440)	**CO 1:** Understand relevance of helping relationship. **CO 2:** Become acquainted with the concept and relevance of counselling in Indian situations. **CO 3:** Understand the skills of counselling. **CO 4:** Elaborate upon theories of counselling.

	CO 5: Understand evaluation in counselling.
SPECIAL EDUCATION-II (OPTIONAL) (EDU-441)	**CO 1:** Describe nature and causes of exceptionality. **CO 2:** Discuss problems of exceptional children in regular school. **CO 3:** Suggest alternative or remedial educational provisions for special children. **CO 4:** List the identifying characteristics of exceptional children.
EDUCATIONAL MANAGEMENT AND EVALUATION-II (OPTIONAL) EDU-442)	**CO 1:** Explain the concepts and techniques of measurement and evaluation. **CO 2:** Develop skills in the construction and standardization of tests. **CO 3:** Explain the applications of advanced statistical techniques.
EDUCATIONAL ADMINISTRATION AND MANAGEMENT-II (OPTIONAL) (EDU-443)	**CO 1:** Highlight need, importance and scope of educational planning. **CO 2:** Describe various approaches to planning. **CO 3:** Explain different stages of educational planning. Discuss the problems in implementing plans. **CO 4:** Explain meaning and functions of supervision in education. **CO 5:** Describe concepts and implications of organizational climate, job satisfaction, motivation and conflict management for teachers and administrators.
M.A. Education 3rd Semester	
HISTORY AND CONTEMPORARY ISSUES OF INDIAN EDUCATION-III (EDU-444)	**CO1:** Understand the Pre-independence and post-independence development of education in India. **CO2:** Understand the factors from historical perspective that contributed to present education system. **CO3:** Explain the important features of various reports, commissions and policies of education during pre and post - independence development of Education - In India.
CURRICULUM DEVELOPMENT-III (EDU-445)	**CO 1:** Explain the concept and components of curriculum. **CO 2:** Explain the foundations of curriculum. **CO 3:** Explain the Principles of curriculum construction. **CO 4:** Describe factors affecting curriculum change. **CO 5:** Explain the role of teacher as curriculum maker. **CO 6:** Explain eclectic model of curriculum design. **CO 7:** Explain Taba's model of curriculum development.
GUIDANCE AND COUNSELLING-III (OPTIONAL) (EDU-446)	**CO 1:**Understand relation between guidance and counselling **CO 2:**Understand importance of assessment in counselling **CO 3:** Learn testing and non-testing techniques of assessment **CO 4:**Understand concept and process of adjustment and mental health

SPECIAL EDUCATION-III (OPTIONAL) (EDU-447)	**CO 1:** Explain nature and causes of exceptionality. **CO 2:** Explain problems of exceptional children in regular school. **CO 3:** Explain the therapeutic or remedial or alternative educational provisions for special children. **CO 4:** Conduct a case study. **CO 5:** Explain social issues related with disability.
EDUCATIONAL MANAGEMENT AND EVALUATION-III (OPTIONAL) (EDU-448)	**CO 1:** Explain the concept and theories of leadership. **CO 2:** Explain different styles of leadership. **CO3:** Describe the leadership traits and skills of educational administrators. **CO 4:** Explain therefore teaching and Training for leadership. **CO 5:** Explain the financial policy for education. **CO 6:** Explain importance of budget preparation for education. **CO 7:** Explain the concept and theories of organizational change. **CO8:** Explain the importance of organizational change and modernization of educational management.
EDUCATIONAL ADMINISTRATION AND MANAGEMENT-III (OPTIONAL) (EDU-449)	**CO 1:** Understand the concept and techniques of measurement and evaluation. **CO 2:** Attain knowledge of the applications of advanced statistical echniques.
M.A. Education 4th Semester	
HISTORY AND CONTEMPORARY ISSUES OF INDIAN EDUCATION-IV (EDU-450)	**CO 1:** Explain the contemporary issues of Indian Education System. **CO 2:** Enlist modern trends of Education in India. **CO 3:** Explain education system from International perspective.
CURRICULUM DEVELOPMENT-IV (EDU-451)	**CO 1:** Understand the concept and need of curriculum design. **CO2:** Describe characteristic features of different designs of curriculum development. **CO3:** Understand the various models of curriculum engineering. **CO4:** Appraise present curriculum of Indian schools. • Discuss curriculum issues and trends.
GUIDANCE AND COUNSELLING-IV (OPTIONAL) (EDU-452)	**CO 1:** Understand concept and problems of Persons with disability (PWDs) **CO 2:**Know importance of counselling of PWDs and their care takers **CO 3:** Familiarized themselves with national incentive for PWDs **CO 4:** Get sensitized to child abuse **CO5:**Understand concepts of career counselling and career development
SPECIAL EDUCATION-IV (OPTIONAL) (EDU-453)	**CO 1:** Explain the nature and causes of exceptionality. **CO 2:** Enlist problems of exceptional children in regular school. **CO 3:** Explain community situation in their own area. **CO 4:** Explain legislation and policies in India.

	CO 5: Explain concept of rehabilitation in Indian Setting.
EDUCATIONAL MANAGEMENT AND EVALUATION-IV (OPTIONAL) (EDU-454)	**CO 1:**The students will be able to: **CO2:** Explain the concepts and techniques of measurement and evaluation. **CO3:** Apply advanced statistical techniques.
EDUCATIONAL ADMINISTRATION AND MANAGEMENT-IV (OPTIONAL) (EDU-455)	**CO1:** Explain implications of Liberalization, Globalization and Privatization on educational management. **CO2:** Discuss implications of Intellectual Property Rights and RTI for educational institutions and educationists. **CO3:** State policy guidelines for setting up private Education – Institutions. **CO4:** Explain administrative processes in educational settings. **CO 5:** Describe the impact of information technology on educational administration and management. **CO6:** Enlist strategies for effective online management of education systems.
Field Work (Dissertation) EDU-456	**CO 1**: To effectively execute research projects. **CO 2**: To develop the link between educational theory and research. **CO3**: To articulate and formulate the research problems. **CO4**: To scientifically design the research plans. **CO5**: To analyse and interpret data quantitatively and qualitatively.

Program Outcomes, Program Specific Outcomes & Course Outcomes of M.A. English

Program Outcomes	**M.A. (English) Program**
PO1.	Students will develop an ability to read texts in relation to their historical and cultural contexts, in order to gain a richer understanding of both text and context, and to become more aware of themselves as situated historically and culturally.
PO2.	Students will value literature, language, and imagination; they will develop a passion for literature and language.
PO3.	They will appreciate literature's ability to elicit feeling, cultivate the imagination, and call us to account as humans.
PO4.	They will cultivate their capacity to judge the aesthetic and ethical value of literary texts–and be able to articulate the standards behind their judgments.
PO5.	They will appreciate the expressive use of language as a fundamental and sustaining human activity, preparing for a life of learning as readers and writers.
PO6.	Students will develop an appreciation of how the formal elements of language and genre shape meaning.
Program Specific Outcomes	**PSOs of M.A. (English) Program**
PSO1.	The students acquire in depth knowledge in literature and humanities which make them sensitive and sensible enough to solve the issues related with mankind.
PSO2.	The students are able to make distinction between the said registers and understand various novelistic discourses as well as dramatic actions for the culture and context of the said literary work.
PSO3.	The learners deploy learnt lessons into their practical lives drawn from stories and poems which sensitize then towards humans, animals and nature.
PSO4.	The student start understanding the genres of literature by interpreting prescribed texts.
PSO5.	The learners understand and appreciate the history and development of Indian literature through the essays.
PSO6.	The learners are able analyse the prescribed novels.
Course Outcomes	**Outcomes MA (English) Sem. I**
Introduction to Literature ENG 521	CO I: To acquire familiarity with a wide variety of forms, styles, structures, and modes in English literature CO II: To identify and understand the significance of these forms in shaping a text's meaning. CO III: To equip them to attempt practical criticism of plays, passages and poems CO IV: To understand how various genres evolved

	CO V: To learn about prominent writers and famous works in English literat
Introduction to Phonetics ENG - 523	CO I: To learn to use correct articulation of English sounds CO II: To use intonation and stress properly. CO III: To appreciate literary form and structure in shaping a text's meaning CO IV: To demonstrate the awareness of evolution theory of language by varied culture CO V: To become proficient in English for global competency
Major Literary Movements & History of English Literature-I ENG - 524	CO I: To learn the history of literary criticism and various literary theories. CO II: To apply critical and technical theory and vocabulary to describe and analyze, and formulate an argument about literary and other texts. CO III: To think about the non-fixity of meaning of literacy texts. CO IV: To develop a skill in applying various literary theories in interpreting a specific text. CO V: To understand the growth and development of English literature
Introduction to Communication Skills—Theories and Practice ENG – 525	CO I: To communicate ethically, responsibly, and effectively as local, national, international, global citizens and leaders. CO II: To lead to a greater understanding of the human communicative action through an objective study of language. CO III: To help students move towards better and intelligible pronunciation and to improve the general standard of pronunciation in everyday conversation. CO IV: To improve their analytical skills and help them to evaluate the different types of works. CO V: To communicate competently in groups and organizations
Course Outcomes	**Outcomes MA (English) Sem. II**
British Drama ENG - 531	CO I: To identify the distinct literary genres of the tragedies, comedies, and histories present in various works CO II: To acquaint them with the literary genre of British Drama, and the rhetorical aspect of drama help them understand how to represent their experience and ideas critically, creatively, and persuasively through the medium of language CO III: To critically analyze British works and interpretation of various critics. CO IV: To display a working knowledge of historic, socio-political, and dramatic trends in plays by the most important playwrights from differing time periods CO V: To show familiarity with major literary works by British writers in field of poetry and drama up to the 17th century.
Introduction to language & Professional Communication Skills	CO I: To write clearly, effectively, and creatively, and adjust writing style appropriately to the content, the context, and nature of the subject. CO II: To think about the relation between language and literature CO III: To possess skills to effectively deliver formal and informal oral presentations to a variety of audiences in multiple contexts.

ENG - 532	CO IV: To help the students overcome the fear of facing an audience, train the students in planning a speech and then draft it CO V: To acquaint students with the major practices in effective public speaking
Grammar and Morphology of English **ENG - 533**	CO I: To develop an in-depth knowledge of various approaches and methods- Direct method, Reading method, Structural Method and Audio-Lingual Method. CO II: To Develop an overview of Communicative Competence and Linguistic Competence CO III: To study of the levels of language description: phonology, morphology and syntax. CO IV: To focus on word stress, aspects of connected speech and tones of intonation which help the learner to improve his/her pronunciation. CO V: To familiarize students with the key concepts of linguistics and develop awareness of the latest trends in language study.
Major Literary Movements & History of English Literature – II **ENG - 534**	CO I: To understand the critical traditions of English literature CO II: To appreciate these texts as a source of great wisdom. CO III: To interpret these texts from contemporary points of view. CO IV: To trace the developmental history of English Literature from Old English Period to 19th century CO V: To examine various literary techniques that writers of 20th century use in writing their texts, and demonstrate an understanding of these techniques.
Course Outcomes	**Outcomes MA (English) Sem. III**
British Novel **ENG - 551**	CO I: To trace the developmental history of English Literature from Old English Period to 19th century. CO II: To help study on Theatre of the Absurd and Globalization CO III: To raise significant questions, gather relevant evidence, reach well-reasoned conclusions, weigh alternative systems of thought, and write as means of intellectual inquiry and creative expression. CO IV: To train them in writing critiques of these novels CO V: To enable students to recognize themes and techniques.
Advanced Business Communication **ENG - 552**	CO I: To increase confidence in speaking publicly. CO II: To develop an understanding of the various writing tasks for specific audiences and purposes CO III: To develop professional skills that prepare them for immediate employment and for life-long learning in advanced areas of management and related fields. CO IV: To learn interpersonal skills such as teamwork, leadership and negotiation, and interpersonal qualities like motivation, initiative and critical self-reflection CO V: To apply knowledge in different situations and the processing sk acquired through the application and synthesis of knowledge

British & American Poetry **ENG - 553**	CO I: To identify and account for distinct literary characteristics of various poetic forms. CO II: To analyze poetic texts using appropriate terms such as diction, tone, imagery, figures of speech, motif, etc CO III: To develop a basic communications plan and describe the role of internal and external communications CO IV: To develop a deeper appreciation of cultural diversity by introducing them to poetry from a variety of cultures CO V: To to improve their understanding of the world the poets lived in
Literary Criticism **ENG - 554**	CO I: To understand the critical traditions of English literature CO II: To trace the development of criticism through the ages. CO III: To recognize the value of multiple perspectives and develop competence in giving and receiving constructive criticism CO IV: To demonstrate knowledge of the history and culture. CO V: To learn historical contexts, psycho-social aspects and discern the vari cultural and moral values associated with the texts.
Course Outcomes	**Outcomes MA (English) Sem. IV**
Media Studies **ENG - 572**	CO I: To write a variety of mass media products, including news stories, press releases, and advertising copy, following accepted journalistic standards, including Associated Press style. CO II: To explore the world of media or journalism CO III: To improve communication in various travel situations for job opportunities CO IV: To create and design emerging media products, including blogs, digital audio, digital video, social media, digital photography, and multimedia CO V: To apply relevant case law involving journalism, the First Amendme and other mass media issues
Indian Writing in English **ENG - 573**	CO I: How and why Indian literature emerged as a distinct field of study. CO II: To show familiarity with major literary works by British writers in the field of Drama and Poetry. CO III: To interpret the works of great writes of Indian writers in English CO IV: To demonstrate, through discussion and writing, an understanding of significant cultural and societal issues presented in Indian English literature CO V: To raise significant questions, reach well-reasoned conclusions, we alternative systems of thought, and enhance their creative expression.
English Language Teaching: Approaches and Methods **ENG - 574**	CO I: To learn to appreciate literature and writers from various nations and cultures. CO II: To read and understand about the rich classical texts CO III: To enhance their ability to understand, appreciate, and discuss works of literature through extensive reading and discussion of short stories, novels and plays.

	CO IV: To apply literary terminology for Narrative, Poetic and Dramatic genres CO V: To appreciate literary form and structure in shaping a text's meaning
Master's Research ENG 600	CO I: To learn to appreciate literature and writers from various nations and cultures. CO II: To undertake a revisionary reading to discover the hidden voices within a text and realize while focusing on an interrogation of the Western canon. CO III: To learn to see critically the rising trends of globalization, capitalism and multi-culturalism. CO IV: To enhances aesthetic sense – admiring the beauty of life and literature CO V: To deepen the knowledge of contemporary world culture through literature

PROGRAM OUTCOMES, PROGRAM SPECIFIC OUTCOMES, COURSE OUTCOMES

M.A. (Hons.) PUNJABI

Program Outcome	1. To be able and capable of holding various posts of Assistant Professor in government and semi-government Colleges/ Universities of Punjab, Haryana, Chandigarh, Delhi and Rajasthan. 2. Opportunities for projects by various Government and funded agencies in the field of culture and folklore in context of Punjab and Himachal Pradesh such as Indian Institute of advanced Study Shimla (IIAS). 3. Eligibility for the posts of Principal and Lecturer of Various Government schools in Punjab, Haryana and Chandigarh. 4. Eligibility for a number of PDF research opportunities under UGC and MHRD after completing Ph.D. 5. Unlimited potential in print media and electronic media, such as newspaper editors, news readers and anchors on Television and as will as Radio broadcasting.
Program Specific Outcome	Being able to get special information about medival Gurmat Poetry (Gurbani) by having honors in Gurmat Subject.
Course: M.A. (Hons.) Punjabi	**Outcomes**
ਪੰਜਾਬੀ ਸਾਹਿਤ ਦੀ ਇਤਿਹਾਸਕਾਰੀ - I (8ਵੀਂ ਸਦੀ – 1850 ਈ.)	ਪੰਜਾਬੀ ਸਾਹਿਤ ਦੀ ਮੁੱਢਲੀ ਇਤਿਹਾਸਕਾਰੀ ਬਾਰੇ ਜਾਣੂ ਹੋਣਾ
ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਅਤੇ ਖੋਜ – ਵਿਧੀ	ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਦੇ ਮੁੱਢ, ਨਿਕਾਸ ਅਤੇ ਵਿਕਾਸ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨ ਦੇ ਨਾਲ-ਨਾਲ ਖੋਜ-ਵਿਧੀ ਦੀਆਂ ਤਕਨੀਕਾਂ ਤੋਂ ਜਾਣੂ ਹੋਣਾ ਤਾਂ ਕਿ ਭਵਿੱਖ ਵਿਚ ਖੋਜ ਕਰਨ ਸਮੇਂ ਇਸਦੀ ਵਰਤੋਂ ਕੀਤੀ ਜਾ ਸਕੇ
ਪੰਜਾਬੀ ਵਾਰਤਕ	ਮੁੱਢਲੀ ਵਾਰਤਕ ਤੋਂ ਲੈ ਕੇ ਆਧੁਨਿਕ ਵਾਰਤਕ ਦੇ ਸਾਰੇ ਰੂਪਾਕਾਰਾਂ ਬਾਰੇ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨ ਦੇ ਨਾਲ-ਨਾਲ ਤਿੰਨ ਵਾਰਤਕ ਪੁਸਤਕਾਂ (ਪੁਰਾਤਨ ਜਨਮ ਸਾਖੀ-ਭਾਈ ਵੀਰ ਸਿੰਘ, ਮੇਰਾ ਪਿੰਡ- ਗਿਆਨੀ ਗੁਰਦਿੱਤ ਸਿੰਘ, ਰੰਗਾਂ ਦੀ ਗਾਗਰ- ਸਰਦਾਰਾ ਸਿੰਘ ਜੌਹਲ) ਬਾਰੇ

	ਆਲੋਚਨਾਤਮਿਕ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ
ਲੋਕਧਾਰਾ ਅਤੇ ਪੰਜਾਬੀ ਸਭਿਆਚਾਰ	ਲੋਕਧਾਰਾ ਅਤੇ ਸਭਿਆਚਾਰ ਦੀ ਸਿਧਾਂਤਕ ਜਾਣਕਾਰੀ ਦੇ ਨਾਲ-ਨਾਲ ਬੁਨਿਆਦੀ ਸੰਕਲਪਾਂ ਨੂੰ ਸਮਝਣ ਉਪਰੰਤ ਪੰਜਾਬ ਅਤੇ ਹਿਮਾਚਲ ਦੀ ਲੋਕਧਾਰਾ ਅਤੇ ਸਭਿਆਚਾਰ ਦੇ ਤੁਲਨਾਤਮਕ ਅਧਿਐਨ ਸਬੰਧੀ ਸਮਰੱਥਾ ਪੈਦਾ ਕਰਨਾ
ਭਾਸ਼ਾ ਅਤੇ ਭਾਸ਼ਾ-ਵਿਗਿਆਨ	ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਅਤੇ ਭਾਸ਼ਾ ਵਿਗਿਆਨ ਦੇ ਸੰਕਲਪਾਂ ਅਤੇ ਵਿਧੀਆਂ ਨੂੰ ਸਮਝਦਿਆਂ ਹੋਇਆ ਪੂਰਬੀ ਅਤੇ ਪੱਛਮੀ ਸੰਕਲਪਾਂ ਸਬੰਧੀ ਸਮਝ ਪੈਦਾ ਕਰਨੀ
ਗੁਰਮਤਿ ਕਾਵਿ - I (ਗੁਰੂ ਨਾਨਕ ਬਾਣੀ ਵਿਸ਼ੇਸ਼ ਅਧਿਐਨ)	ਗੁਰਮਤਿ ਕਾਵਿ ਦੀ ਸਿਧਾਂਤਕ ਜਾਣਕਾਰੀ ਦੇਣ ਦੇ ਨਾਲ-ਨਾਲ ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਜੀ ਦੀਆਂ ਤਿੰਨ ਬਾਣੀਆਂ ਜਪੁਜੀ ਸਾਹਿਬ, ਆਸਾ ਦੀ ਵਾਰ ਅਤੇ ਬਾਰਾਂਮਾਹ ਤੁਖਾਰੀ ਦਾ ਅਧਿਐਨ ਕਰਨਾ
ਪੰਜਾਬੀ ਸਾਹਿਤ ਦੀ ਇਤਿਹਾਸਕਾਰੀ - II (1851ਈ. – ਹੁਣ ਤੱਕ)	ਆਧੁਨਿਕ ਕਾਲ ਤੋਂ ਲੈ ਕੇ ਸਮਕਾਲੀ ਪੰਜਾਬੀ ਸਾਹਿਤ ਦੀ ਸੰਯੁਕਤ ਇਤਿਹਾਸਕਾਰੀ ਬਾਰੇ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨਾ
ਪੰਜਾਬੀ ਕਿੱਸਾ ਕਾਵਿ	ਪੰਜਾਬੀ ਕਿੱਸਾ ਕਾਵਿ ਦੇ ਇਤਿਹਾਸ ਬਾਰੇ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨ ਦੇ ਨਾਲ-ਨਾਲ ਪ੍ਰਮੁੱਖ ਤਿੰਨ ਕਿੱਸਿਆਂ (ਹੀਰ-ਵਾਰਿਸ ਸ਼ਾਹ, ਪੂਰਨ ਭਗਤ-ਕਾਦਰਯਾਰ ਅਤੇ ਸੱਸੀ ਪੁੰਨੂ) ਬਾਰੇ ਆਲੋਚਨਾਤਮਿਕ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ
ਭਾਰਤੀ ਅਤੇ ਪੱਛਮੀ ਸਾਹਿਤ ਸਿਧਾਂਤ	ਭਾਰਤੀ ਅਤੇ ਪੱਛਮੀ ਸਾਹਿਤ ਸਿਧਾਂਤਾਂ ਦੇ ਪ੍ਰਸੰਗ ਵਿਚ ਪੰਜਾਬੀ ਆਲੋਚਨਾ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨੀ
ਆਧੁਨਿਕ ਪੰਜਾਬੀ ਕਵਿਤਾ	ਆਧੁਨਿਕ ਪੰਜਾਬੀ ਕਵਿਤਾ ਬਾਰੇ ਸਿਧਾਂਤਕ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨ ਦੇ ਨਾਲ-ਨਾਲ ਆਧੁਨਿਕ ਕਵਿਤਾ ਦੀਆਂ ਤਿੰਨ ਪਾਠ-ਪੁਸਤਕਾਂ (ਹਾਸ਼ੀਏ ਦੇ ਹਾਸਿਲ-ਡਾ. ਰਾਜਿੰਦਰ ਪਾਲ ਸਿੰਘ ਬਰਾੜ (ਸੰਪਾ.), ਲਹਿਰ ਹੁਲਾਰੇ – ਭਾਈ ਵੀਰ ਸਿੰਘ ਅਤੇ ਸੁਰਜ਼ਮੀਨ-ਸੁਰਜੀਤ ਪਾਤਰ) ਬਾਰੇ ਆਲੋਚਨਾਤਮਿਕ ਜਾਣਕਾਰੀ ਹਸਿਲ ਕਰਨੀ
ਪੰਜਾਬੀ ਸੂਫ਼ੀ ਕਾਵਿ	ਪੰਜਾਬੀ ਸੂਫੀ ਕਵਿਤਾ ਦੇ ਇਤਿਹਾਸ ਦੇ ਹਵਾਲੇ ਨਾਲ ਬਾਬਾ ਫ਼ਰੀਦ, ਸ਼ਾਹ ਹੁਸੈਨ ਅਤੇ ਸੁਲਤਾਨ ਬਾਹੂ ਦੇ ਕਲਾਮ ਦਾ ਅਧਿਐਨ ਕਰਨਾ
ਗੁਰਮਤਿ ਕਾਵਿ - II	ਗੁਰਮਤਿ ਕਾਵਿ ਦੇ ਇਤਿਹਾਸਿਕ ਪਰਿਪੇਖ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨ ਦੇ ਨਾਲ-ਨਾਲ ਅਨੰਦ ਸਾਹਿਬ-ਗੁਰੂ ਅਮਰਦਾਸ, ਸਲੋਕ ਮਹਲਾ ਨੌਵਾਂ- ਗੁਰੂ ਤੇਗ ਬਹਾਦਰ ਜੀ ਅਤੇ ਭਾਈ ਗੁਰਦਾਸ ਦੀ ਪਹਿਲੀ ਵਾਰ ਦਾ ਅਧਿਐਨ ਕਰਨਾ
ਪੰਜਾਬੀ ਕਹਾਣੀ	ਆਧੁਨਿਕ ਪੰਜਾਬੀ ਕਹਾਣੀ ਸਬੰਧੀ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨ ਦੇ ਨਾਲ-ਨਾਲ ਤਿੰਨ ਪਾਠ ਪੁਸਤਕਾਂ (ਮੇਰੀਆਂ ਸ੍ਰੇਸ਼ਟ ਕਹਾਣੀਆਂ-ਕੁਲਵੰਤ ਸਿੰਘ

	ਵਿਰਕ, ਚਾਦਰ ਹੇਠਲਾ ਬੰਦਾ-ਸੁਖਵੰਤ ਕੌਰ ਮਾਨ ਅਤੇ ਆਹਟ-ਬਲਦੇਵ ਸਿੰਘ ਧਾਲੀਵਾਲ (ਸੰਪਾ.) ਦਾ ਆਲੋਚਨਾਤਮਿਕ ਅਧਿਐਨ ਕਰਨਾ।
ਪੰਜਾਬੀ ਆਲੋਚਨਾ	ਪੰਜਾਬੀ ਆਲੋਚਨਾ ਦਾ ਸਿਧਾਂਤ ਅਤੇ ਇਤਿਹਾਸ ਜਾਨਣ ਉਪਰੰਤ ਤਿੰਨ ਪਾਠ ਪੁਸਤਕਾਂ (ਸਾਹਿਤਾਰਥ-ਸੰਤ ਸਿੰਘ ਸੇਖੋਂ, ਕਾਵਿ ਅਧਿਐਨ-ਅਤਰ ਸਿੰਘ, ਅਧਿਐਨ ਅਤੇ ਅਧਿਆਪਨ-ਹਰਿਭਜਨ ਸਿੰਘ) ਦਾ ਅਧਿਐਨ ਕਰਨਾ
ਪਾਕਿਸਤਾਨੀ ਪੰਜਾਬੀ ਸਾਹਿਤ	ਪਾਕਿਸਤਾਨੀ ਪੰਜਾਬੀ ਸਾਹਿਤ ਦਾ ਸੰਖੇਪ ਇਤਿਹਾਸ ਜਾਨਣ ਉਪਰੰਤ ਤਿੰਨ ਪਾਠ ਪੁਸਤਕਾਂ (ਦੁਖ ਦਰਿਆਓਂ ਪਾਰ ਕੇ-ਅਤਰ ਸਿੰਘ ਅਤੇ ਡਾ, ਜਗਤਾਰ, ਚੋਣਵਾਂ ਪਾਕਿਸਤਾਨੀ ਪੰਜਾਬੀ ਨਾਟਕ-ਡਾ. ਸਤੀਸ਼ ਕੁਮਾਰ ਵਰਮਾ ਅਤੇ ਡਾ, ਨਸੀਬ ਬਵੇਜਾ, ਪਾਕਿਸਤਾਨੀ ਪੰਜਾਬੀ ਕਹਾਣੀ-ਡਾ. ਸ਼ਹੀਨ ਮਲਿਕ) ਦਾ ਅਧਿਐਨ ਕਰਨਾ
ਗੁਰਮਤਿ ਕਾਵਿ - III	ਗੁਰਮਤਿ ਕਾਵਿ ਦੀਆਂ ਰੂਪਾਕਾਰਕ ਵੰਨਗੀਆਂ ਦੱਸਣ ਦੇ ਨਾਲ-ਨਾਲ ਸੁਖਮਨੀ ਸਾਹਿਬ-ਗੁਰੂ ਅਰਜਨ ਦੇਵ, ਬਾਰਾਂਮਾਹ ਮਾਝ-ਗੁਰੂ ਅਰਜਨ ਦੇਵ, ਜਾਪੁ ਸਾਹਿਬ-ਗੁਰੂ ਗੋਬਿੰਦ ਸਿੰਘ ਦਾ ਅਧਿਐਨ ਕਰਨਾ
ਆਪਸ਼ਨ ਪਹਿਲੀ – ਪੰਜਾਬੀ ਨਾਟਕ	ਪੰਜਾਬੀ ਨਾਟਕ ਦਾ ਇਤਿਹਾਸ ਅਤੇ ਪ੍ਰਵਿਰਤੀਆਂ ਦੱਸਣ ਉਪਰੰਤ ਤਿੰਨ ਨਾਟਕਾਂ (ਗਗਨ ਮੈ ਥਾਲ-ਬਲਵੰਤ ਗਾਰਗੀ, ਇਸ਼ਕ ਬਾਝ ਨਮਾਜ ਦਾ ਹੱਜ ਨਾਹੀਂ-ਅਜਮੇਰ ਔਲਖ, ਸ਼ਾਇਰੀ-ਸਵਰਾਜਬੀਰ) ਦਾ ਅਧਿਐਨ ਕਰਨਾ
ਪਰਵਾਸੀ ਪੰਜਾਬੀ ਸਾਹਿਤ	ਪਰਵਾਸੀ ਪੰਜਾਬੀ ਸਾਹਿਤ ਬਾਰੇ ਸਿਧਾਂਤਕ ਅਤੇ ਇਤਿਹਾਸਕ ਜਾਣਕਾਰੀ ਉਪਰੰਤ ਤਿੰਨ ਪਾਠ ਪੁਸਤਕਾਂ (ਵਰਤਮਾਨ ਦੇ ਆਰ-ਪਾਰ-ਦਰਸ਼ਨ ਬੁਲੰਦਵੀ (ਸੰਪਾ.), ਦਿੱਸਹੱਦਿਆਂ ਦੇ ਆਰ-ਪਾਰ-ਹਰਿਭਜਨ ਸਿੰਘ (ਸੰਪਾ.), ਡੌਂਗੀਟੇਲ ਡਰਾਈਵ-ਇਕਬਾਲ ਮਾਹਲ ਦਾ ਅਧਿਐਨ ਕਰਨਾ
ਗੁਰਮਤਿ ਕਾਵਿ – IV (ਭਗਤ ਬਾਣੀ ਵਿਸ਼ੇਸ਼ ਅਧਿਐਨ)	ਗੁਰਮਤਿ ਕਾਵਿ ਦੀਆਂ ਪ੍ਰਵਿਰਤੀਆਂ ਬਾਰੇ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨ ਉਪਰੰਤ ਭਗਤ ਕਬੀਰ, ਭਗਤ ਨਾਮਦੇਵ ਅਤੇ ਭਗਤ ਰਵਿਦਾਸ ਦੀ ਬਾਣੀ ਦਾ ਅਧਿਐਨ ਕਰਨਾ
ਆਪਸ਼ਨ ਪਹਿਲੀ – ਪੰਜਾਬੀ ਨਾਵਲ	ਪੰਜਾਬੀ ਨਾਵਲ ਦੇ ਸਿਧਾਂਤ , ਇਤਿਹਾਸ ਅਤੇ ਪ੍ਰਵਿਰਤੀਆਂ ਬਾਰੇ ਜਾਣਕਾਰੀ ਹਾਸਿਲ ਕਰਨ ਉਪਰੰਤ ਤਿੰਨ ਨਾਵਲਾਂ (ਤੂਤਾਂ ਵਾਲਾ ਖੂਹ-ਸੋਹਣ ਸਿੰਘ ਸੀਤਲ, ਤੀਨ ਲੋਕ ਸੇ ਨਿਆਰੀ-ਦਲੀਪ ਕੌਰ ਟਿਵਾਣਾ, ਯੁੱਧਨਾਦ-ਮਨਮੋਹਨ ਬਾਵਾ) ਦਾ ਅਧਿਐਨ ਕਰਨਾ

M.A Instrumental

Programme Outcome	1. To be able to persue higher studies in the discipline 2. To be able to expertise as performer at AIR & doordarshan level. 3. To be able to work as teacher at PGT Level. 4. To be able to persue different genre of Music as collaborative fusion bands.
Programme Specific Outcome	1. To be able to play traditional style of instrumental recital. 2. To be able to expertise proficiency in playing the instrument. 3. To have a an overall non- theoretical and grammatical concepts of Indian Classical Music. 4. To aquire the knowledge of Indian Classical Music from ancient to modern times. 5. To develop a critical and analytical understanding of Gurmat Sangeet.
Semester 1	
Course Learning Outcome MAIN- 521 (General and Applied Theory of Indian Classical Music); Part -1	1. Students learn to write the Notation of Talas with Laya karies. 2. Acquire to know the difference between Tantarkari & Gayaki Ang in Instrumental Music. 3. The student gets to know the History and comparative study of the Ragas. 4. Students learn to study of classification of Indian Musical Instruments.
Course Learning Outcome MAIN – 522 (Aesthetical study of Indian Music); Part-1	1. Students gain knowledge of technical terminology of the Instruments. 2. The students get to know the concepts Raag and Rasa, detailed study of the Gram, evolution of Notation system. 3. Students learn the description of various prescribed Ragas. 4. Students learn to about tanpura & Shayak Naad.
Course Learning Outcome MAIN – 523 (Practical- Staze Performance)	1. The students will know how to tune their respective own Instruments. 2. They will grasp the various grammatical aspects of the prescribed Ragas, like how they arise, what are the respective rules that govern these ragas, what are the performing in the prescribed ragas. 3. He will learn the art of playing. 4. The students will develop the confidence to perform a raga for a long duration of time.

	5. Students learn to play dhuns.
Course Learning Outcome MAIN – 524 (Practical; Viva- VOCE)	1. With other basic ragas, the students will understand how to use the flat and sharp notes I ragas with tenel phrases 2. The student will be able to explain the grammatical rules of a raga in detail. 3. He will develop the confidence to differentiate between similar raagas.
Semester 2nd	
Course Learning Outcome MAIN – 531 (General and Applied Theory of Indian Classical Music); Part -2	1. The student will gain knowledge about the various styles of playing instrumental music that will help him to enjoy the concert like Solo presentation & Jugalbandi etc. 2. The student will come to know about the ability to write composition in Vilambit Gat and Dhun Gat. Student gain knowledge of technical terminology of the Instruments.
Course Learning Outcome MAIN – 532 (Aesthetical study of Indian Music); Part-2	1. Acquire learn & understand the importance of Laya & Taal in Indian Music. 2. Students learn about to make new Good composition quality. 3. Students gain knowledge of technical terminology of the Instruments.
Course Learning Outcome MAIN – 533 (Practical- Staze Performance)	1. The students will develop confidence to perform a raag for a long duration of time. 2. The student will know how to tune their own Instruments. 3. The students develop the ability to play fast composition in various ragas with elaboration. 4. Students will able to hold opted instrument and its function.
Course Learning Outcome MAIN – 534 (Practical; Viva- VOCE)	1. The students will be able to explain the grammatical rules of a raag in detail. 2. He will also be able to demonstrate 3. How to separate similar sounding ragas. 4. The students understand the characteristics of selected Ragas of the Unit.
Semester 3rd	
Course Learning Outcome MAIN – 551 (History of Indian Music); Part-1	1. The student will come to know about how various musical Instruments of India are made, and are categorized on the basis of solids, animal skin, wind and metallic strings. This will enhance his knowledge and will be beneficial in future research on musical Instruments. 2. The student will know about the life and contribution of legends like Smt. Hira Bai Barodkar, Smt (dr.) N Rajam,

	and how their works have shaped the present Hindustan music. 3. The student will come to know about Indian music during the Vedic times. He will thus understand its progress and development from then to how. It will enhance his knowledge in the field of musically and also help him in the field of research in ancient Indian Music. 4. The students understand the History & Comparative study of the Ragas.
Course Learning Outcome MAIN – 552 (Critical Study of Gurmat Sangeet); Part -1	1. Students will come to know about Importance of Music in Siri Guru Granth Sahib Ji. 2. The Students will come to know about Ragas of Gurmat Sangeet which are based of Folk Music. This Knowledge will help him to become a better stage performer of Gurmat Sangeet.
Course Learning Outcome MAIN – 553 (Practical- Staze Performance)	1. The students of this course get to know the structure, tuning and playing technique of Instruments. 2. The students will develop confidence to perform a arrag for a long duration of time. 3. The students will be able to play A Gat in Chautaal (Dhrupad Style) with and in- depth knowledge of its style of performance.
Course Learning Outcome MAIN – 554 (Practical; Viva- VOCE)	1. The students will be able to demonstrate how to separate similar sounding ragas. 2. The students will be able to explain the grammatical rules of a raga in detail. 3. Basic knowledge about accompaniment with vocal & Instrumental music in different taalas.
Semester 4th	
Course Learning Outcome MAIN - 571 (History of Indian Music) Part- 2	1. Aquire the historical and comparative knowledge of Ragas of Gurmat Sangeet. 2. Aquire the knowledge of evolution of percussion Instruments. 3. Student will be able to write composition in Staff Notation System. 4. Student will be able to calculate 484 Ragas from one That. 5. Aquire the knowledge of concept of time theory of Indian Music and Terminology for the Musician used in Ancient Granth.
Course Learning Outcome MAIN – 572 (A Critical Study of Gurmat Sangeet) Part -2	1. Aquire the knowledge of Chaounki Parampara and Gurmat Sangeet. 2. Aquire the knowledge the knowledge of different Gyan Shellies of Gurmat Sangeet. 3. Understanding the contribution of Rababies in Gurmat Sangeet.

	4. Student will be able to develop and understanding towards the qualities of Kirtania.
Course Learning Outcome MAIN – 573 (Practical- Staze Performance)	1. The students of this course get to know the structure, tuning and playing technique of Instruments. 2. The students will develop confidence to perform a arrag for a long duration of time. 3. The students will be able to play A Gat in Chautaal (Dhrupad Style) with and in- depth knowledge of its style of performance.
Course Learning Outcome MAIN – 574 (Practical; Viva- VOCE)	1. The students will be able to demonstrate how to separate similar sounding ragas. 2. The students will be able to explain the grammatical rules of a raga in detail. 3. Basic knowledge about accompaniment with vocal & Instrumental music in different taalas.
Course Learning Outcome MAIN – 600 (Project)	1. Student will be able to draft a project related to Indian Classical Music focusing either on practical or theoretical aspects thereby developing and analytical approach and aptitude toward research for higher studies.

M.A (Vocal)	
Program outcome	To be able attain expertise in the discipline andpursue Higher education To be able to pursue career in the discipline as professional performer To be able to employed as school teacher at PGT level in the discipline To be able to collaborate with musician of other genres in fussion bands as performer To develop as musicologist To be able to to develop as enterpenure by capitalizing self-employment opportunities
Program specific outcome	To be able to perform Hindustani classical vocal recital in traditional manner To be able to perform various Gaayan shilies of Hindustani classical music To be able to present elaborations of ragas in different taals To acquire the knowledge of History of Indian music, its practical & theoretical concepts and aesthetical relevance To be able to acquire the practical and conceptual knowledge og Gurmat Sangeet
Sem: I	
General and Applied Theory of Indian Classical Music, **(Part - 1) MAVO-521**	I: Acquire the knowledge of Historical and comparative study of prescribed ragas. II: Students will be able to write notations of compositions in vilambit khayal and in drut khayal (other than Teen Taal) in the prescribe ragas III: Being aware of Tanpura and Sahayak Naad. IV: Acquire the knowledge of Nibadh and Anibadh Gayan (From ancient to modern time). V: Acquire the practical aspect of Taal and Laykaries like aadh , kuaad and biaad.

	VI: Being aware of Principles of Stage-Performance. VII: Being aware of differences and similarities of Karnataki and Hindustani Music with special reference to Swar, Raag and Taal.
Aesthetical study of Indian Music (Part -1) MAV0-522	I: Acquire the knowledge of the principles of Aesthetics in the context of music. II: Acquire the concepts of Harmony and Melody and its applications in music. III: Being aware of Evolution of notation system, its merits and de-merits. IV: Acquire the knowledge of the concept of *Gram* V: Being aware of The influence of aesthetical elements in music performances. VI: Understanding the concepts of Raag and Rasa & Music and Fine Arts.
Stage Performance **(MAVO-523)**	I: Student will be able to tune Tanpura. II : Student will be able to demonstrate one raag with Vilambit Khayal, Drut Khayal and Tarana. III: Student will be able to compose shabads / bhajans, in Keherva Taal and in Dadra Taal . IV: Student will have the exposure to perform in front of the audiences.
Practical Viva-Voce **MAVO- 524**	I: Student will be able to acquire Detailed and analytical Knowledge of Ragas for viva-voce. II: Student will be able to present Vilambit Khayal with Drut Khayal and Chaturang / Trivat. III: Student will be able to present Drut khayal with Gayaki. IV: Student will learn the singing style of Jhaptaal. V: Student will be able to present the comparative study of ragas with practical elaborations.
Sem : II	
General and Applied Theory of Indian Classical Music	I: Students will acquire Historical and comparative knowledge of the prescribed ragas

(Part - 2) MAVO - 531	II: Students will be able to compose and writethe poetry in Drut Khayal pattern III: Acquire the knowledge of Principles of musical composition in Indian Music. IV: Acquire the knowledge of Devotional aspect of music. V: Students will acquire the knowledge of *Gharana System* with special reference to *Khayal Gayaki*. VI: Students will understand the aesthetical significance and social relevance of the art form in present era VII: Acquire the knowledge of Principles of *Alap* and *Taan.*
Aesthetical study of Indian Music, **(Part – 2) MAVO-532**	I: Acquire the knowledge of Concept of Raag-Dhayan -Chitra. II: Student will be able to understand the the aesthetical terms: Meend, Gamak, Khatka, Murki, Kan-Swar and Avirbhava-Tirobhava in detail with historical reference. III: Understand the theoretical aspect of Gayaki and its elements. IV: Acquire the knowledge of acoustical terms and its scientific law. V: Understanding the concept of raag-mishran. VI: Understanding the relation of Raag with season and time.
Stage performance **MAVO - 533**	I: Student will be able to demonstrate one raag with Vilambit Khayal, Drut Khayal and Tarana. II: Student will be able to compose shabads/bhajans, in rupak and Deepchandi Taal. III: Student will have the exposure to perform in front of the the audiences. IV: Students will be able to present a composition in Dhamar style with laykaris.
Practical Viva Voce **MAVO - 534**	I: Student will be able to acquire Detailed and analytical Knowledge of Ragas for viva-voce. II: student will be able to present Vilambit Khayal with Drut Khayal and Chaturang / Trivat. III: Student will be able to present Drut khayal with Gayaki. IV: Student will learn the singing style of Ektaal. V: Student will be able to present the comparative study of ragas with practical elaborations.
Sem – III	

History of Indian Music, (Part - 1) MAVO- 551	I: Acquire the historical and comparative knowledge of the prescribed ragas. II: Acquire the knowledge of Indian Music in Vedic period , Hindu period , Muslim period , British period and Post-Independence era. III: Acquire the knowledge of development of Musical Scales of Indian Music IV: Obtain the differences of Shruti- Swar distribution in Ancient, Medieval and in Present time student will be able to analyze the contribution of the great female Vocalist and Instrumentalist. V: Students will be khave insight to important treaties of Ancient and medieval period Being aware of history of harmonium and its implications in Indian classical music. VI: Understand the concept of of Moorchhna.
A critical study of Gurmat Sangeet **(Part - 1) MAVO-552**	I: Acquire the historical and comparative knowledge of the prescribed ragas Acquire the knowledge of origin and development of *Gurmat sangeet.* II: Student will be able to understand the objectives, singing style , theoretical concepts and other differences of *Gurmat Sangeet* and *Hindustani Music*. III: Student will be able to analyze the significance of String Instruments in Gurmat Sangeet. IV: Student will be able to explain the importance of Music in *Sri Guru Granth Sahib and understand the* salient features of *Gurmat Sangeet.* V: Students will be able to analyze the *Raagas* of *Gurmat Sangeet* which are based on Folk Music.
Stage performance **MAVO- 553**	I: Student will be able to tune Tanpura. II: Student will be able to demonstrate one raag with Manglacharan in *Vilambit Khayal style , Shabad in Drut Khayal* style and Padhtaal. III: Students will be able to present Dhrupad with different laykaris in traditional style. IV: Student will have the exposure of stage performance.
Practical **Viva-voce**	I: Student will be able to acquire Detailed and analytical Knowledge of Ragas of Gurmat Sangeet tradition for viva-voce. II: student will be able to present e*Vilambit Khayal* with *Drut Khayal* and *Chaturang*/ *Trivat.* III: Student will be able to present Drut khayal with Gayaki.

MAVO 554	IV: Student will learn the singing style of Rupak taal with all elements of Gayaki. V: Student will be able to present the comparative study of ragas with practical elaborations.
Sem : IV	
History of Indian Music **(Part - 2)** **MAVO 571**	I: Acquire the historical and comparative knowledge of the prescribed ragas. II: Student will be able to understand the phenomena of development of Raag-Classification system from ancient to present time. III: Student will be able to write composition in staff notation. IV: Acquire the theory of evolution and development of percussion instruments. V: Student will be acquainted of methodology of Thesis writing VI: Student will be able to calculate 484 Ragas from one Thaat. VII: Acquire the detailed knowledge of Time theory of Ragas. VIII: Being aware of ancient terminology describing fetures of musician from Indian perspective.
A Critical Study of Gurmat Sangeet, **(Part - 2) MAVO - 572**	I: Acquire the historical and comparative knowledge of the prescribed ragas of Gurmat Sangeet II: Acquire the knowledge of Ragas with reference to *Shri Guru Granth Sahib*. III: Student will be able to explain the Contribution of *Rababi Musician* in the field of *Gurmat Sangeet*. IV: *Being aware of the 'Chownki Parampara'* of *Gurmat Sangeet*. V: Understand the qualities of good *Keertania*. VI: Acquire the knowledge of different *Gayan Shellies* of *Gurmat Sangeet.* VII: Will understand thee commonalities of Ragas of Gurmat sangeet and Indian classical music.
Stage performance **MAVO- 573**	I: Student will be able to tune Tanpura. II: Student will be able to demonstrate one raag with manglacharan in *Vilambit Khayal style , Shabad in Drut Khayal* style and Padhtaal .

	III: Student will be able to perform Rag Mala or Guldasta . IV: Student will have the exposure to perform in front of the audiences.
Practical Viva Voce **MAVO- 574**	I: Student will be able to acquire Detailed and analytical Knowledge of Ragas pf Gurmat Sangeet for viva-voce. II: Student will be able to present *Vilambit Khayal* with *Drut Khayal* andtarana. III: Student will be able to sing *Chaturang*/ *Trivatwith its gayaki style*. IV: Student will be able to present Drut khayal with Gayaki. V: Student will learn the singing style of Ada chautaal. VI: Student will be able to present the comparative study of ragas with practical elaborations.

Program Outcomes, Program Specific Outcomes & Course Outcomes of Ph.D. English

Program Outcomes	**Ph.D. (English) Program**
PO1.	Students can understand the concepts and methods of research.
PO2.	Students are able to develop research proposal and can work with problems.
PO3.	Students learn to use various research methods for their research work.
PO4.	Students can come to certain conclusion after completing the research work.
PO5.	Students can continue their research work for further or post-doctoral research.
Program Specific Outcomes	**PSOs of Ph.D. (English) Program**
PSO1.	After completion of Ph.D. program the Research Scholar will know how to choose the problem for research in literature and language area.
PSO2.	Understand the concepts of research fundamentals and methodology.
PSO3.	He will guide further to make comparative and contrastive analysis of English language and literature with other languages and literature in other languages.
PSO4.	Ph.D. holders in English are respected for their scholarly contribution in English.
PSO5.	Researchers in English can get job of an English teacher/lecturer anywhere in the world.
Course Outcomes	**Outcomes**
Indian Writing in English ENG 602	CO I: To provide an overview of the various phases of the evolution of Indian writing in English. CO II: To introduce students to the thematic concerns, genres and trends of Indian writing in English. CO III: To understand the genre of Indian Writings in English. CO IV: To gain insight into "Indianness" through representative works. CO V: To identify the relationship between Indian Writing in English and its social context and able to respond to Indian texts critically
Contemporary World Literature (Fiction and Non-Fiction) ENG 605	CO I: To critically analyze world literary texts in the light of several movements in literature. CO II: To analyse literary texts through the perspective of Gender CO III: To know some of the developments, themes and narrative strategies of the works by different authors

	CO IV: To analyze works of fiction and drama for plot structure, setting, characterization, theme, and narrative point of view CO V: To develop a comparative perspective to study the texts
Women Writers in English ENG 606	CO I: The students will have an awareness of class, race and gender as social constructs and about how they influence women's lives. CO II: They will be able to explore the plurality of female experiences. CO III: They will be equipped with analytical, critical and creative skills to interrogate the biases in the construction of gender and patriarchal norms CO IV: To earn how and on what grounds women's writings can be considered as a separate genre CO V: They will read and understand canonical texts written by Women writers across different ages

Ph.D. Music	
Programme Outcome	1. To be able to employed at college of University level and work as Assistant professor. 2. Will be able to work as Music collagist in the discipline of research. 3. To pursue carrier as performer choosing research in practical field. 4. To be able to work in research project funded by government. 5. To work in the field of research and explore the historical, scientific and social political influences of the discipline.
Programme Specific Outcome	1. Student will be acquainted with the methodology of research. 2. Student will be able to develop an analytical and critical thinking towards the various aspects of music. 3. Student will be able to develop specialization in the subject on the topic chosen. 4. Acquire the knowledge of historical aspects of the discipline. 5. Acquire the knowledge of various branches of research in the discipline. 6. Student will be able to write and draft research papers in the discipline.
MUS 601 Historical study of Indian Music.	1. Acquire the knowledge of Indian Music during Vedic Times. 2. Acquire the knowledge of music in the times of Ramayana and Mahabharta. 3. Acquire the knowledge of medieval music and understand how the Indian Classical Music System and ragas have evolved to their modern- day avatars. 4. Will be acquainted with music forms, musical instruments and musical traditions of the ancient period. 5. Will be acquainted with symbols of Indian Musician the Granths of Ancient period.
MUS 602 Contribution of Scholars of Indian Music and the study of Important *Granthas* (treatise)	1. Students will be acquainted with the knowledge of Sanskrit Granthas of the medieval period. 2. Acquire e the knowledge of Svar, Shuriti and Raag , Taal and mela system of Medieval period 3. Acquire the knowledge of contribution of scholar's for Indian Music various musician of the Medieval period. 4. Acquire the knowledge of contribution of scholar's for Indian Music in the modern period. 5. Contribution of Music colleges in the discipline which will further acquaint the students of various branches of discipline.
MUS – 609 Research Methodology	1. The students would learn about various research methods used in research. 2. To know how to do survey of literature in specific field and how to write synopsis for research proposal.

	3. To understand research as career; current status and future prospects of a specific research field. 4. To learn experimental designs, sampling designs, recording of observation, measurement and scaling techniques.
MUS – 607 Seminar	1. Students will be able to present the synopsis seminar and there by having a exposure as speaker 2. Will be able to develop analytical approach to look at the research questions on the spot interrogated by the research committee member 3. Will be able to develop a methodological approach for thesis writing as suggested research committee member.
MUS – 701 Dissertation*	1. Students will learn how to work on a research topic assigned to him/her by their supervisor/mentor with a purpose to develop a collective approach to study, analyze and solve the problem.

Programme: Ph. D (Zoology)

POGRAMME OUTCOMES (POs)

PO 1: Gain a thorough grounding in the fundamentals in different areas of Zoology such as ecology, biodiversity, entomology, developmental biology, applied zoology etc.

PO 2: Develop the skill of applying concepts and techniques used in animal sciences.

PO 3: Apply ethical principles in animal behaviour, wild life conservation etc.

PO 4: Effectively aware the society about human wildlife conflict.

PO 5: Develop an attitude to perform effectively and efficiently as a leader as well as a member of a team in a sustainable development.

PO 6: Ability to engage in lifelong learning.

PO 7: To integrate knowledge, skill and attitude that will sustain an environment of learning and creativity among the students.

PO 8: Exposure about museums, zoos, national parks, sanctuaries, apiary, diary, vermicomposts units and laboratories.

PO 9: Enabling students to be capable of making decisions at personal and professional level.

PO 10: Getting prepared for post graduate studies and other competitive exams in order to achieve success in their professional careers.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO 1: Students will be able to develop, demonstrate and disseminate the knowledge and skills to laymen about climate change, pollution, communicable diseases and biodiversity.

PSO 2: Students also acquire skills to work as animal trainers, animals care takers, conservationists, lab technicians, zookeeper, wildlife biologists and many more.

PSO 3: Students will be able to play roles of animal breeder, forensic experts, lab technicians etc. which will help learners to possess knowledge and other soft skills and to react aptly when confronted with critical or unethical decision making.

PSO 4: Students will learn modern techniques such as composite culture such as pisciculture, aquaculture, sericulture, lac culture, oyster culture etc. applying these skills in their future careers in Zoology and other applied fields.

PSO 5: Students will be able to develop and demonstrate knowledge of applied zoology in integrated farming system for sustainable development.

PSO 6: Students will gain thorough systematic and subject skills within various disciplines of entomology, parasitology, embryology, physiology, ecology and applied zoology (apairy, diary, vermiculture etc.).

PSO 7: Learners will be able to recognize the role of zoologist, animals and wild life educators, veterinarian, entomologist, parasitologist etc. which will help learners to possess knowledge and other soft skills.

PSO 8: Learners will acquire the skills like effective communication, decision - making, problem solving in day to day life affairs.

PSO 9: Learners will involve in various co-curricular activities to demonstrate relevancy of foundational and theoretical knowledge of their academic major and to gain practical exposures therein.

PSO 10: Apart from theoretical knowledge learners can also acquire practical skills to work as zoo keeper, wildlife educators, animal trainers, veterinarian and various sectors such as healthcare centres, Pharmaceutical companies, pathology labs, medical camps academic institutions etc.

Course	Course outcomes (COs)
	Ph. D Zoology
Research Methodology (ZOO-609)	**CO 1:** To equip the students about history, myths and ethnic practices and research process. **CO 2:** To know about how to write synopsis of research projects etc. **CO 3:** To know the importance of computer and informatics in research. **CO 4:** Students should be aware about the current status and future prospects of research
Tools and Techniques for Research in Zoology (ZOO-606)	**CO 1:** Students will be get knowledge about microscopy, its principle & applications along with the other techniques used in biochemistry and Microbiology. **CO 2:** Students will get knowledge about Chromatography, Electrophoresis their principle type and applications. Radioisotopes and main isotope techniques in biology.

	CO 3: Students will learn about histological techniques: Principles of tissue fixation, microtomy, staining, mounting and other parameters used in histochemistry. **CO 4:** Students will study various cell culture techniques: Culture media, essential components and Preparation, Cell viability testing and Polymerase chain reaction (PCR).
Advances in Parasitology (ZOO-601)	**CO 1:** Students will understand Pathogenesis due to protozoans and helminth parasites (animal and plant- parasitic nematodes). Basis of host cell parasite interactions with special reference to autoimmune response and pathogenesis of protozoan diseases in general. **CO 2:** Students will learn how to prepare in vitro culture of protozoan and helminth parasites in the laboratory. **CO 3:** Students will examine ecobiology of egg and larval forms in helminth parasites along with egg hatching mechanisms in these parasites. **CO 4:** It will also help the students to understand the effect of parasitism on the host and reaction of host in reponse to these parasites.
Advanced topics in Entomology (ZOO-602)	**CO 1:** To equip the students about insect pheromones and allelochemicals. **CO 2:** This course will felicitate the students about insect toxicology Bio-chemistry and behavioural Physiology. **CO 3:** Students will learn about type of nervous system, signal transmission and Diapause found in insects. **CO 4:** Students will learn about eco-friendly pest control systems such as Biological control and Integrated Pest Management (IPM) etc.
Special topics in Biochemistry ((ZOO-603)	**CO 1:** Understanding of covalent properties of proteins. **CO 2:** Proper understanding of protein structure and their folding. **CO 3:** Students will learn about enzyme kinetics. **CO 4:** Students will understand the importance of molecular biology and medical biochemistry.
Advanced topics in Cytogenetic and Molecular	**CO 1:** Learners can acquire knowledge on structural gnomics: genome sequencing, Chromosome maps, Physical Mapping of Genomes and use of genome maps in genetics analysis.

Genetics (ZOO-604)	**CO 2:** Learners can learn various cytogenetic techniques used in molecula biology. **CO 3:** Understanding of molecular tools used in biology. **CO 4:** Students will be able to understand evolutionary genetics and its role in modern context
Advanced topics in Physiology (605)	**CO 1:** Students will be able to understand stem cells and their role in myogenesis. **CO 2:** Understanding the concept of metabolic fuels and effects of exercise, training on muscle metabolism, anapleuroslis in muscle, muscle glutamine and oxidative stress. **CO 3:** Students will learn basics of smooth muscle excitation and contraction. **CO 4:** Students will understand calcium dependent activation of contractile mechinary in vertebrate smooth muscle.

Courses Offered by Department of Mathematics for Program Outcome of B.Sc. (Hon's) Mathematics

Program Outcomes, Program Specific Outcomes, Course Outcomes

Program Outcomes	Program Outcome of B.Sc. (Hon's) Mathematics
PO1.	Graduating with Honours in Mathematics allows to be eligible for M.Sc. in Mathematics program.
PO2.	Brief knowledge in Mathematics and understanding of research area in mathematics or statistics.
PO3.	Developed the confidence and ability to work independently and be able to recognize a given real world mathematical problem in which domain of mathematics it falls.
PO4.	Learned to evaluate relevant literature and incorporate it appropriately when introducing the background to a piece of work
PO5.	Developed the ability to communicate technical ideas effectively, both in writing and also in an oral or in writing presentation
PO6.	They will be able to write computer program in C Language and be able to apply in solving real world problem
PO7.	They will be able to formulate and solve mathematical model of a real-world problem.
PO8.	Completion of the Honours program should also enhance job prospects.
Program Specific Outcomes	**PSOs of B.Sc. (H) Mathematics Program**
PO1.	Demonstrate proficiency in writing proofs
PO2.	Investigate and apply mathematical problems and solutions in a variety of contexts related to science, technology, business and industry, and illustrate these solutions using symbolic, numeric, or graphical methods
PO3.	Investigate and solve unfamiliar math problems

Courses Offered by Department of Mathematics for Program Outcome of B.Sc. (Hon's) Mathematics

Program Outcomes, Program Specific Outcomes, Course Outcomes

Course Outcomes	**Algebra (MATH-122)** CO 01: Students will be able to recognize different type of Matrices. CO 02: They will be able to find out Eigen Values and Eigen Vectors CO 03: Students will be able to solve system of linear equations. CO 04: Students will be able to apply the knowledge of solving cubic and biquadrate equations in practical problems. CO 05: Students will know the property of bilinear and quadratic forms.
Credits	LTP:3/1/0
Course Outcomes	**Calculus (MATH-123)** CO 01: Students will be able to understand limit, continuity, and able to apply differentiation in different type practical problems. CO 02: They understand different properties of curves. CO 03: Students will be able to draw different type Cartesian and polar curves. CO04: Students will be able to know how to calculate area, volume and length of different shapes.
Credits	LTP:3/0/1
Course Outcomes	**dvanced Calculus (MATH-211)** CO 01: Student understand the concept of Continuity, Sequential continuity, properties of continuous functions uniform continuity CO 02: Understand the basic knowledge of Chain rule of differentiability, Mean value theorems Rolle's theorem and Lagrange's mean value theorem and their geometrical interpretations. CO 03: Application of Taylor's theorem with various form of remainders, Darboux intermediate value theorem for derivatives Indeterminate forms. CO 04: Basic idea of Limit and continuity of real valued functions of two variables, Partial differentiation, Total differentials, Composite functions and implicit functions, change of variables, CO 05: Application of Homogeneous functions and Euler's theorem on homogeneous functions. CO 06: Application Taylor's theorem for functions of two variables Differentiability of real valued functions of two variables, CO 07: Learn about Implicit function theorem, Maxima, Minima and saddle points of two variables, Lagrange's method of multipliers Curves, CO 08: Learn about Tangents, Principal normal, Binomials, Serret-Frenet formulas,

	Locus of the centre of curvature, Spherical curvature, Locus of centre of spherical CO 09: Learn about curvature, Involutes, Evolutes, Bertrand curves, Surfaces, Tangent planes, one parameter family of surfaces.
Credits	TP:3/1/0
Course Outcomes	**Linear Algebra (MATH-212)** CO 01: Student will be able to apply basic arithmetic operations on vectors and matrices, including inversion and determinants, using technology where appropriate; CO 02: Able to solve systems of linear equations, using technology to facilitate row reduction; CO 03: Know the basic terminology of linear algebra in Euclidean spaces, including linear independence, spanning, basis, rank, nullity, subspace, and linear transformation; CO 04: The abstract notions of vector space and inner product space; CO 05: Able to find eigenvalues and eigenvectors of a matrix or a linear transformation, and using them to diagonalize a matrix; CO 06: projections and orthogonality among Euclidean vectors, including the Gram-Schmidt orthonormalization process and orthogonal matrices;
Credits	LTP:3/1/0
Course Outcomes	**Ordinary Differential Equation (MATH-213)** CO 01: They will be able to solve homogeneous and non-homogeneous linear differential equation and its application. CO 02: They will be able to solve different type differential equations. CO 03: students will be able to apply Variation of Parameter for solving differential equations. CO 04: students will be able to apply Method of Undetermined Coefficient for solving differential equations. CO 05: They will be able to apply Lagrange's Method for solving linear differential equation.
Credits	LTP:3/0/1
Course Outcomes	**Mathematical Modeling - I (MATH-214)** CO 01: Student understand about Equilibrium point, node, saddle points, focus Centre with examples and figures.

	CO 02: Students learn about linearization of non-linear problems. CO 03: Students learn about Modeling of blood flow, oxygen transfer in red cells and other mathematical formulations of real-life problems. CO 04: Formulation and Analysis of Single species model, Logistic model. CO 05: Understand the two-competing species Lotaka-Volterra models and its analysis. CO 06: Formulation and analysis of different type epidemic models. CO 07: Through this course students learn about different type real life mathematical models and their analysis.
Credits	LTP:3/0/1
Course Outcomes	**Boolean algebra (MATH-215)** CO 01: Student will learn about fundamentals of set theory. CO 02: Student will learn Lattice theory. CO 03: Student will learn logic gate and switching circuits and its applications
Credits	LTP:3/1/0
Course Outcomes	**Numerical Methods (MATH-221)** CO 01: Explain the consequences of finite precision and the inherent limits of the numerical methods considered. CO 02: Select appropriate numerical methods to apply to various types of problems in engineering and science inconsideration of the mathematical operations involved, accuracy requirements, and available computational resources. CO 03: Demonstrate they understand the mathematics concepts underlying the numerical methods considered. CO 04: Demonstrate understanding and implementation of numerical solution algorithms applied to the following classes of problems: CO 05: Student will be able to apply different numerical techniques to solve real world problems through programming in C.
Credits	LTP:3/0/1
Course Outcomes	**Sequence and Series (MATH-222)** CO 01: Students will be able to understand different characteristics of set theory. CO 02: At the end of this course the students will be able to apply the convergence and divergence of a given series by using different tests.

	CO 03: Students will be able to understand about arbitrary series and their condition of convergence and divergence.
Credits	LTP:3/1/0
Course Outcomes	**Solid Geometry (MATH-223)** CO 01: They will be able to recognize different type of three-dimensional geometric objects. CO 02: They will be able to understand basic three-dimensional objects like plane, sphere, conicoid and different type equations of these objects. CO 03: They will be able to transform objects from one system to another.
Credits	LTP:3/1/0
Course Outcomes	**Vector Calculus (MATH-224)** CO 01: They understand about scalar, vectors and their different properties. CO 02: They will be able to apply different type operators in practical problems. CO 03: They will be able to solve vector integration, CO 04: Students will be able to apply Greens, Stokes and Divergence theorem. CO 05: Students will be able to transform problems from one system to another.
Credits	LTP:3/1/0
Course Outcomes	**Mathematical Modeling -II (MATH-225)** CO 01: Students will learn behavior of fluid flow. CO 02: Student will understand the behavior of heat flow in different geometries. CO 03: Student will understand the behavior of application of wave equation CO 04 Student will be able to formulate mathematical models in electrical circuit theory.
Credits	LTP:3/0/1
Course Outcomes	**Groups and Rings (MATH-311)** CO 01: Students will be able to understand different type of theorems in algebra. CO 02: students will be able to apply Group, Ring and Field theory in practical applications.

	CO 03. They apply the knowledge of Groups and Rings in coding theory, quantum mechanics and many other fields. CO 04: They understand about Unique Factorization Domain, Euclidean Domain and Principle Ideal Domain.
Credits	LTP:3/1/0
Course Outcomes	**Partial Differential Equations (MATH-312)** CO 01: They will understand basic knowledge of Partial Differential Equations. CO 02: Most of the real-world problems are formulated in Mathematical models, which are formulated in the form of partial differential equations. CO 03: They will be able incorporate this knowledge in mathematical models. CO 04: They will be able to classify partial differential equations and change into canonical form. CO 05: Students will be able to solve one- and two-dimensional Heat equation, Wave equation and Laplace equations.
Credits	LTP:3/0/1
Course Outcomes	**Real Analysis (MATH-313)** CO 01: They understand about basic idea of integration of functions. CO 02: They will be able to understand application of Mean value theorems. CO 03: students will be able to analyze convergence and divergence of improper integrals through different tests. CO 04: Students will apply this knowledge in boundedness, finite intersection property, compactness, connectedness, components, continuity in relation with continuity in relation connectedness in Metric Space.
Credits	LTP:3/1/0
Course Outcomes	**Special functions and Integral Transforms (MATH-314)** CO 01: Students will be able to apply series solution method to solve practical problems of differential equations CO 02: students will understand the application of Laplace; inverse Laplace transform and Fourier transforms. CO 03: They will recognize and solve different type differential equations. CO 04: Students will be able to apply convolution theorem.

Courses Offered by Department of Mathematics for Program Outcome of B.Sc. (Hon's) Mathematics

Program Outcomes, Program Specific Outcomes, Course Outcomes

Credits	LTP:3/1/0
Course Outcomes	**Statics (MATH-315)** CO 01: They understand about static forces and its resolution. CO 02: They understand about equilibrium of forces. CO 03: They apply the knowledge of friction, Centre of gravity, virtual work in real life situation. CO 04: They will understand about Stable and unstable equilibrium position. CO 05: Students will be able to apply the knowledge of forces in three dimensions.
Credits	LTP:3/1/0
Course Outcomes	**Combinatorial Mathematics (MATH-316)** CO 01: Student will learn basic counting principle. CO 02: Student will learn Recurrence relation and Generating function. CO 03: Student will learn Polya's counting theory.
Credits	LTP:3/1/0
Course Outcomes	**Multivariate calculus (MATH-317)** CO 01: Student will be able to understand point set topology. CO 02: Student will be able to learn linear transformation from R^m to R^n. Student will learn Riemann Integral and its properties. Student will learn Lebesgue's integral and its properties.
Credits	LTP:3/0/1
Course Outcomes	**Graph Theory (MATH-318)** CO 01: Student will be able to understand basic properties of graph and trees. CO 02: Student will learn Walk path and circuit. CO 03: Student will be able to solve Travelling salesman problem though graph path and circuit.
Credits	LTP:3/1/0
Course Outcomes	**Automata Theory (MATH 319)** CO 01: Student will learn Finite Automata.

	CO 02: Student will be able to understand Languages and Grammar. CO 03: Student will learn Turing Machines.
Credits	LTP:3/1/0
Course Outcomes	**Portfolio optimization (MATH-320)** CO 01: Student will learn financial markets and types of risk and mutual funds. CO 02: Student will be able to understand Mean Variance Portfolio optimization techniques. CO 03: Student will learn capital market theory and security market lines.
Credits	LTP:3/1/0
Course Outcomes	**Industrial Mathematics (MATH330)** CO 01: Students will be able to medical imaging and inverse problems based on the calculus. CO02: Students will learn about X-Rey behavior Radon transform and back projection. CO 03: They will learn Fourier and Inverse Fourier transform and their properties in image reconstructions.
Credits	LTP:3/1/0
Course Outcomes	**Bio Mathematics (MATH-326)** CO 01: Students will be able to understand mathematical biology and their modelling process. CO02: Students will learn about the different epidemic models. CO 03: They will learn spatial and discrete models.
Credits	LTP:3/1/0
Course Outcomes	**Applied Statistics (MATH-331)** CO 01: Students will be able analyse time series and index number. CO02: Students will learn Statistical Quality Control. CO 03: They will learn to measure mortality rate, standardize death rate.
Credits	LTP:3/1/0
Course Outcomes	**Cryptography and Network security (MATH-328)** CO 01: Students will be able to understand Cryptography principles and its applications.

	CO02: Students will be able to understand Network attacks and IP spoofing. CO 03: Students will be able to understand IP security architectures.
Credits	LTP:3/1/0
Course Outcomes	**History of Mathematics (MATH-329)** CO 01: Students will be able to learn various branches of mathematics. CO02: Students will be able to understand geometry and history of ancient mathematics (Hindu and Arabic). CO03: Students will be able to understand geometry and history of Greek mathematics.
Credits	LTP:4/0/0
Course Outcomes	**Statistics (MATH-311)** CO 01: Students will be able to analyze the raw data. CO02: Students apply the concept of sampling theory. CO 03: They will apply different type of tests like chi square test, t-test, Z-test and F- tests, CO 04: They will be able to apply correlation and regression in practical problems. CO 05: They will understand different type of distributions such as Normal, Binomial, Poisson.
Credits	LTP:3/1/0
Course Outcomes	**Linear Programming (MATH - 322)** CO 01: Student will understand about formulation of Linear Programming problem and its graphical solution. CO 02: They will analyze the basic property of convex and concave functions. CO 03: Student will understand about solution of Linear programming problem by Simplex method. CO 04: They will apply the big M- Technique, The two-phase method, Principle of duality in linear programming problem. CO 05: Student will be able to solve Transportation and Assignment problems.
Credits	LTP:3/1/0
Course Outcomes	**Dynamics (MATH321)** CO01: Basic terminologies of Dynamics

	CO02: Understand General motion of a rigid body, and apply in practical problems CO03: Able ability to apply knowledge of Dynamics in science and engineering CO04: Be proficient in the use of mathematical methods to analyze the forces and motion a system. CO05: Be able to identify, formulate, and solve science and engineering problems.
Credits	LTP:3/1/0
Course Outcomes	**Number theory and trigonometry (MATH-323)** CO 01: Students will gain the knowledge about g.c.d, l.c.m., fundamental theorem of arithmetic, linear congruence, Fermat's theorem, Wilson's theorem. CO 02: Students will gain the knowledge about the area complete residue system, Euler's theorem, Fermat's theorem, Chinese remainder theorem, gauss lemma. CO 03: Students will apply their knowledge in the field of greatest integer function, Moebius function, Moebius inversion formula. CO 04: Students will get the knowledge in the area De-Moivre's theorem, trigonometric function, hyperbolic function. CO 05: Students will get the knowledge in the area inverse circular and hyperbolic function, logarithmic of a complex quantity Gregory's series.
Credits	LTP:3/1/0
Course Outcomes	**Programming in C and Numerical Techniques (MATH-324)** CO 01: Student will understand about the basic concept of C language. CO 02: They will apply C language in solution of different practical problems. CO 03: Students will be able to solve problems through programming in C and also handling functions CO 04: They will solve linear and nonlinear problems using C language. CO 05: They will be able to solve Integration, and solution of ordinary differential equations with C programming.
Credits	LTP:3/0/1
Course Outcomes	**Real and complex analysis (MATH-325)** CO 01: Students will get the knowledge about the area Jacobeans, beta and gamma functions, double and triple integral CO 02: Students will get the knowledge in the field Fourier series, Fourier transform, half range series.

	CO 03: Students will get the knowledge in the field of stereographic projection of complex number, continuity and differentiability of complex function, analytic function, and harmonic function. CO 04: Students will gain the knowledge in the area of conformal mapping, mobius transformation, fixed points, critical mapping.
Credits	LTP:3/0/1

Programme: B.Sc. Medical (Three-year degree program)

PROGRAMME OUTCOMES (POs)

PO1: Gain a thorough grounding in the fundamentals in different areas of ecology, biodiversity, entomology, developmental biology, applied zoology etc.

PO2: Develop the skill of applying concepts and techniques used in animal sciences.

PO3: Apply ethical principles in animal behavior, wild life conservation etc.

PO4: Effectively aware the society about human wildlife conflict.

PO5: Develop an attitude to perform effectively and efficiently as a leader as well as amember of a team in a sustainable development.

PO6: Ability to engage in lifelong learning.

PO7: To integrate knowledge, skill and attitude that will sustain an environment of learningand creativity among the students.

PO8: Exposure about museums, zoos, national parks, sanctuaries, apairy, diary,vermi-compost units and laboratories.

PO9: Enabling students to be capable of making decisions at personal and professional level.

PO10: Getting prepared for post graduate studies and other competitive exams in order to achieve success in their professional careers.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: Students will be able to develop, demonstrate and disseminate the knowledge and skills to laymen about climate change, pollution, communicable diseases and biodiversity.

PSO2: Students also acquire skills to work as animal trainers, animals care takers, conservationists, lab technicians, zookeeper, wildlife biologists and many more.

PSO3: Students will be able to play roles of animal breeder, forensic experts, lab technicians etc. which will help learners to possess knowledge and other soft skills and to react aptly when confronted with critical or unethical decision making.

PSO4: Students will learn modern techniques such as composite culture such as pisciculture,aquaculture, sericulture, lac culture, oyster culture etc. applying these skills in their future careers in Zoology and other applied fields.

PSO5: Students will be able to develop and demonstrate knowledge of applied zoology in integrated farming system for sustainable development.

PSO6: Students will gain thorough systematic and subject skills within various disciplines ofentomology, parasitology, embryology, physiology, ecology and applied zoology (apairy, diary, vermin-culture etc.).

PSO7: Learners will be able to recognize the role of zoologist, animals and wild life educators, veterinarian, entomologist, parasitologist etc. which will help learners to possess knowledge and other soft skills.

PSO8: Learners will acquire the skills like effective communication, decision - making, problem solving in day to day life affairs.

PSO9: Learners will involve in various co-curricular activities to demonstrate relevancy of foundational and theoretical knowledge of their academic major and to gain practical exposures therein.

PSO10: Apart from theoretical knowledge learners can also acquire practical skills to work as zoo keeper, wildlife educators, animal trainers, veterinarian and various sectors such as healthcare centres, Pharmaceutical companies, pathology labs, medical camps academic institutions etc.

COURSE OUTCOMES (COs)

B.Sc. Medical First Semester	
Course	**Course Outcomes (COs)**
Basic Communication Skills (ENG-101)	CO1: To learn basic about English language and its importance in global commutation. CO2: Develop skills to read and write poems, essays and short stories. CO3: To know how to make effective sentences and use of grammar.
Introduction to Computer Applications (COMP-101)	CO1: To know basic applications of computers in different organizations. CO2: Understanding, types of Computer systems like Micro, Mini, Mainframe and Super Computers. CO2: To know about input and output devices, Data Processing and storage.
Basic Organic Chemistry (CHEM-111)	CO1: To understand the basic concepts of Organic Chemistry. CO2: Learn about different type of reagents and reaction intermediates used in chemical reactions. CO3: Get familiarize with the initial concepts of stereochemistry with special emphasis on optical isomerism, relative and absolute configurations. CO4: Acquire knowledge regarding geometrical isomerism and conformational isomerism. CO5: Gather information pertaining to the synthesis and chemical reactions of alkanes and cycloalkanes. CO6: Develop the understanding of practical knowledge and apply them in experiments.
Basic Zoology (ZOO-101)	CO1: Students should learn the basics of Zoology, characteristics of living organisms. Description of typical plant and animal cells, DNA, RNA, mitotic and meiotic cell divisions. CO2: Students should learn zoological nomenclature and principles of classification of non-chordates. CO3: Students should learn systematic position of chordates. CO4: learn fundamental anatomy and physiology of various systems of chordates.
Evolutionary Biology (ZOO-112)	CO1: Students should know about the evolution of complex organic molecule from complex inorganic compounds and formation of photobionts (first primitive cell). CO2: Equip the students about patterns of similarities and differences among living beings over time and across habitats through action of biological processes such as natural selection, mutation and genetic drift. CO3: Students should learn about phylogeny and evolutionary history of horse and man. CO4: Students should know about geological time scales, eras, epochs and evolution of various animal groups in these ages.
Algae (BOT-111)	CO1: Understand the diversity among Algae. CO2: Know the systematic, morphology and structure, of Algae. CO3: Understand the life cycle pattern of Algae. CO4: Understand the useful and harmful activities of Algae.

Fungi (BOT-112)	CO1: Understand the Biodiversity of Fungi CO2: Know the Economic Importance of Fungi CO3: Understand the morphological diversity of Fungi.
B.Sc. Medical Second Semester	
Basic Inorganic Chemistry (CHEM-121)	CO1: To learn importance of de Broglie matter waves, Schrodinger wave equation and some important basic principles of atomic structure. CO2: To understand the principle of atomic, ionic radii, ionization energy, and electron affinity and electron negativity. CO3: To learn about chemical bonding, VBT theory, and hybridization and VSEPR theory. CO4: To understanding the chemical bonding and Molecular orbital theory. CO5: To understanding the ionic structures, radius ratio effects and coordination numbers.
Environmental Science (EVS-301)	CO1: To understand the need for public awareness for environment. CO2: To learn about renewable and non-renewable resources, problems associated with Natural resources. CO3: To know about ecosystems, structure and function of an ecosystem. CO4: Understand biodiversity and impact on environment, conservations of bio resources. CO5: Environmental pollution and causes and remedies.
Principles of Genetics (ZOO-122)	CO1: Physical basis of heredity – Mendelism, interaction of genes, multiple alleles, chromosome structure and function in Eukaryotes (except in chemistry, models and concepts). CO2: Polytene chromosomes, lampbrush chromosomes., Cell division _Mitosis & Meiosis., Sex determination-Sex chromosomes & sex chromatin, different types of sex mechanisms. CO3: Chromosome changes- Structural aberrations and its significance. Numerical changes, polyploidy and its types. CO4: Nature of genes-Double helix structure of DNA, mechanisms of DNA replication. Changes in genesSpontaneous mutations and induced Mutations, physical and chemical mutagens.
Cell Biology (ZOO-121)	CO1: Understand basic aspects of prokaryotic and eukaryotic cells, cell theory and classification of cells and molecular composition of cells. CO2: To learn about cell cycle and its phases, cell membrane structure and models pertaining to it. Membrane proteins and carbohydrates and their role; transport across membranes. CO3: To know about cell organelles and in depth study of their structure and functions. Cytoskeleton, types and their functions. CO4: Learn about cancer: its development and causes, types, properties, early detection and treatment.
Genetics (PBG-101)	CO1: To understand basic about elements of heredity and variation CO2: To learn Chromosomes and Heredity CO3: To know about Gene Interactions and modified dihybrid ratios. CO4: To understand Mutations and mutagens, role of induced mutations in crop improvement and monitoring environmental mutagens. CO5: To understand structure and biosynthesis of RNA and DNA; DNA as genetic material; transformation, transduction.
Bryophytes	CO1: Understand the morphological diversity of Bryophytes.

(BOT-121)	CO2: Understand the economic importance of the Bryophytes. CO3: Understand the life cycle of Bryophytes.
Pteridophytes (BOT-122)	CO1: Understand the morphological diversity of Pteridophytes. CO2: Understand the economic importance of the Pteridophytes. CO3: Know the evolution of Pteridophytes.
B.Sc. Medical Third Semester	
Basic Physical Chemistry (CHEM-211)	CO1: Student will lean about gaseous state of matter, postulates of Kinetic theory of gases, critical phenomenon. CO2: To understand qualitative discussion of the Maxwell's distribution of molecular velocities and liquefaction of gases. CO3: To learn basic about chemical kinetics and its scope, factors influencing the rate of a reaction-concentration CO4: To understand the importance of second law of thermodynamics with statements, Carnot cycle and its efficiency, some important thermodynamic parameters in thermodynamics and their variation. CO5: To learn the physical significance of Free energy and work function, their variation with temperature and pressure, Maxwell relation and third law of thermodynamics.
Human Values and Ethics (EDU-101)	CO1: Understanding the need, basic guidelines, content and process of value education, self-exploration, continuous happiness and prosperity, fulfillment of basic aspirations of human being. CO2: To learn importance of universal human values and ethical human conduct, basis for holistic alternative towards universal human order CO3: To learn about Professional ethics and issues in professional ethics.
Punjabi Lazmi (PBI-111)	CO: To learn basic about the Punjabi language, writing and speaking.
Diversity of Non chordates–1 (ZOO-211)	CO1: Introduction to parasitic protozoans of man (*Entamoeba*, *Giardia*, *Trypanosoma* and *Leishmania*. CO2: To know about morphology, anatomy, systematic position, morphology, distinctive characters, distribution ecology and economic importance of the cnidarian. CO3: To know about morphology, anatomy, systematic position, morphology, distinctive characters, distribution ecology and economic importance of the aschelminthes. CO4: To know about morphology, anatomy, systematic position, morphology, distinctive characters, distribution ecology and economic importance of the Platyhelminthes.
Diversity of Chordates I (ZOO-213)	CO1: To know about morphology, anatomy, systematic position, morphology, distinctive characters, distribution ecology and economic importance of the Protochordates. CO2: To know about morphology, anatomy, systematic position, morphology, distinctive characters, distribution ecology and economic importance of the Cyclostomata. CO3: To know about morphology, anatomy, systematic position, morphology, distinctive characters, distribution ecology and economic importance of the Chondrichthyes.

	CO4: To know about morphology, anatomy, systematic position, morphology, distinctive characters, distribution ecology and economic importance of the Actinopterygii.
Gymnosperm (BOT-211)	CO1: Understand the morphological diversity of Gymnosperms. CO2: Understand the economic importance of the Gymnosperms. CO3: Know the evolution of Gymnosperms.
Systematics of Angiosperms (BOT-212)	CO1: Understand the habit of the angiosperm plant body. CO2: Know the vegetative characteristics of the plant. CO3: Learn about the reproductive characteristics of the plant. CO4: Understand the plant morphology and basic taxonomy.
B.Sc. Medical Fourth Semester	
Inorganic Chemistry-III (CHEM-221)	CO1: To learn importance of hydrides of nitrogen, nitrogen halides, oxides and oxyacid. CO2: To understand the principle of chemical reactivity and dioxygen as a ligand (basic idea only), structure of O_3 and H_2O_2, clathrate hydrates allotropic forms of S & Se, structures of halides. CO3: To learn about the halogen Family (chemical reactivity, group trends, chemistry of preparation of fluorine, hydrogen halides. CO4: To understanding the symmetry, group theory symmetry elements and symmetry operations. CO5: To understanding the properties of irreducible representations and character tables.
Physical Chemistry-III (CHEM-222)	CO1: To enhance scientific knowledge in kinetic theory of gases, understand transport properties and some important laws of diffusions. CO2: To understand thermodynamics of diffusion, relation between transport properties. CO3: To learn basic about equilibrium electrochemistry, some important laws, theories and application of conductometric titrations. CO4: To know dynamic electrochemistry, processes at electrodes, double layer at the interface, applications of dynamic electrochemistry in power generation, power storage (batteries). CO5: To enhance knowledge about chemical, kinetics of complex reactions, Importance of catalysts in kinetics.
Diversity of Non Chordates–II (ZOO-221)	CO1: To know about morphology, anatomy, systematic position, morphology, distinctive characters, distribution ecology and economic importance of the Arthropoda. CO2: To know about morphology, anatomy, systematic position, morphology, distinctive characters, distribution ecology and economic importance of the Echinodermata. CO3: To know about morphology, anatomy, systematic position, morphology, distinctive characters, distribution ecology and economic importance of the Mollusca.

	CO4: To know about morphology, anatomy, systematic position, morphology, distinctive characters, distribution ecology and economic importance of the hemichordata.
Diversity of Chordates –II (ZOO-222)	CO1: To know about morphology, anatomy, systematic position, morphology, distinctive characters, distribution ecology and economic importance of the amphibia. CO2: To know about morphology, anatomy, systematic position, morphology, distinctive characters, distribution ecology and economic importance of the reptilia. CO3: To know about morphology, anatomy, systematic position, morphology, distinctive characters, distribution ecology and economic importance of the aves. CO4: To know about morphology, anatomy, systematic position, morphology, distinctive characters, distribution ecology and economic Importance of the Mammalia.
Plant Physiology (BOT-221)	CO1: Know importance and scope of plant physiology. CO2: To understand the plants and plant cells in relation to water. CO3: Understand the process of photosynthesis in higher plants with particular emphasis on light and dark reactions, C3 and C4 pathways. CO4: Understand the respiration in higher plants with particular emphasis on aerobic and anaerobic respiration. CO5: Learn about the movement of sap and absorption of water in plant body. CO 6: Understand the plant movements.
Embryology of Angiosperms (BOT-222)	CO1: Know the methods of pollination and fertilization. CO2: Know fertilization, endosperm and embryogeny. CO3: Understand the process of sporogenesis and embryogenic development.
Plant development & anatomy (BOT-223)	CO1: Understand the scope & importance of Anatomy.CO2: Know various tissue systems. CO3: Understand the normal and anomalous secondary growth in plants andtheir causes. CO4: Perform the techniques in anatomy.
B.Sc. Medical Fifth Semester	
Inorganic Chemistry-IV (CHEM-311)	CO1: To learn importance of coordination compounds, classical ligands, non-classical ligands and multidentate ligands. CO2: To understand the concept of isomerism in coordination compounds, nomenclature and stability of coordination compounds. CO3: To learn about the valence bond theory for bonding in coordination compounds, concept of multiple bonding, strength and weaknesses of valence bond approach. CO4: To understanding the splitting of d-orbitals in different fields for example octahedral and tetrahedral complexes. CO5: To understanding the concept of thermodynamic effects of crystal field splitting and enthalpies of hydration of M^{2+} ions.
Organic	CO1: Learn the synthesis and chemical reactions of nitrogen and

Chemistry-IV (CHEM-313)	organosulphur compounds. CO2: Develop the understanding of five and six membered heterocyclic compounds along with condensed five and six membered heterocyclic. CO3: Recognize the importance and chemistry of saccharides,disaccharides and polysaccharides. CO4: Understand the difference between fats and oil, soaps and detergentsand get acquaint with the synthesis of synthetic dyes. CO5: To know the chemistry related to amino acids, peptides, proteins andnucleic acids. CO6: Practice to perform single and multi-step organic reactions.
Developmental Biology (ZOO-312)	CO1: To know about gametogenesis with particular reference to differentiation of spermatozoa and vitellogenesis. CO2: To know about fertilization and metamorphosis. CO3: Fate maps of chick and frog embroys. CO4: Mammalian placenta–its formation, types and functions.
Applied Zoology (ZOO-315)	CO1: To know about useful animals and their products. CO2: To know about important human and veterinary parasites-protozoanand helminths. CO3: To know about Arthropods and vectors of human diseases and theirmode of transmission. CO4: Biology and control of chief insect pests, birds and mammals ofagricultural importance.
Phytopathology (BOT-313)	CO1: Know the terminologies in plant pathology. CO2: Understand the scope and importance of Plant Pathology. CO3: Know the prevention and control measures of plant diseases andits effect on economy of crops.
Plants Ecology & Environment (BOT-314)	CO1: Understand the ecological concepts as well as the ability to applyecological knowledge to manage and remediate environmental problems. CO2: To apply systems concepts and methodologies to analyse and understand interactions between social and environmental processes. CO3: To understand the bio-geochemical cycles & ecological successions.
Plants and Human Welfare (Economic Botany) (BOT-315)	CO1: Understand the role plants in human welfare. CO2: Gain knowledge about various plants of economic use. CO3: Know importance of plants & plant products. CO4: Understand the chemical contents of the plant products. CO5: Know about the utility of plant resources.
B.Sc. Medical Sixth Semester	
Physical Chemistry-V (CHEM-322)	CO1: To learn importance of quantum mechanics, failure of classical concepts and some important basic principles of quantum mechanics. CO2: To understand the behaviour of particle in one and three dimensional box with translational energy, energy levels, quantization of energy and applications of particle in a box model. CO3: To learn about angular momentum, approximate Methods, operators used in quantum mechanics.

	CO4: Developing understanding for Valence-bond and molecular orbital approaches, electronic structures and pi-electron approximation.
Organic Chemistry-V (CHEM-323)	CO1: To learn importance of acyclic molecules, conformation, steric stereo electronic effects and enantiomeric relationships. CO2: To understand the concept of free radical, carbanion nucleophile substitution reaction mechanism and regioselectivity. CO3: To learn about the alkylation of aldehydes, Favorskii rearrangements and aldol condensations. CO4: To understanding the concept of photochemistry, Jablonski diagram, inter-system crossing singlet and triplet states. CO5: To understanding the concept of concerted reactions, unimolecular rearrangement andelimination reactions.
Comparative Anatomy of Non-Chordates (ZOO-321)	CO1: To know about morphology, anatomy, systematic position, morphology, distinctive characters, distribution ecology and economic importance of the Protozoan. CO2: To know about morphology, anatomy, systematic position, morphology, distinctive characters, distribution ecology and economic importance of the important parasitic protozoans. CO3: General organisation, Comparative account of canal system, skeletal system, reproduction and development of sponges. CO4: Corals and coral formation, polymorphism and affinities of thegroup
Comparative Anatomy of Chordates (ZOO-323)	CO1: To know about Integumentary System. CO2: To know about Skeletal System. CO3: To know about Muscle System. CO4: To know about respiratory and digestive system. CO5: To know about sense organs. CO6: To know about circulatory system. CO7: To know about nervous system CO8: To know about urinogenital system and reproductive system
Plant Biotechnology (BOT-322)	CO1: Gain knowledge about the mechanism and essential component required for prokaryotic DNA replication. CO2: Understand the fundamentals of Recombinant DNA Technology. CO3. Know about the Genetic Engineering. CO4: Understand the principle and basic protocols for Plant Tissue Culture. CO5: The concept of operon and its structure and regulation.
Plant breeding and crop improvement (BOT-323)	CO1: Understand the science of plant breeding. CO2: To introduce the student with branch of plant breeding for the survival of human being from starvation. CO3: To study the techniques of production of new superior crop verities. CO4: Understand the modern strategies applied in plant breeding for crop improvement i.e. Mass selection, Pure line Selection and Clonal selection.

Programme and Course Outcomes
B.Sc. Non-Medical (Three-Year Degree Programme)

PROGRAMME OUTCOMES (POs)

PO 1: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO 2: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO 3: 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.

PO 4: Apply appropriate techniques, resources using computer software skills, models, IT tools to solve complex problems with an understanding of the limitations.

PO 5: Sensitized for environmental sustainability concerns and understand the need for sustainable development.

PO 6: Demonstrate ethical principles and commit to professional ethics and responsibilities and norms of the scientific practice.

PO 7: Communicate effectively on complex activities with the scientific 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

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: Students will be able to clearly understand the concepts and applications in the field of Physics, Chemistry and Mathematics along with Environment and Management, Social and Professional Ethics and Computer Applications.

PSO2: Students have the capability to grasp the technological advancements in the usage of physical science to analyze and design techniques/methods for a variety of applications.

PSO3: Students will be capable for placement opportunities and to pursue career oriented higher education in an interdisciplinary areas in India as well as abroad in the practice of Project, Aptitude and Management and Leadership.

PSO 4: Students will be able to develop and demonstrate knowledge of statistical tools used in sciences.

PSO 5: Learners can also acquire practical skills to work as chemist, faculty and other industrial supporting services.

COURSE OUTCOMES (CO_S)

B.Sc. Non-Medical First Semester	
Course	**Course Outcomes (COs)**
Mechanics (PHY-111)	CO1: Define the frame of references and understand Newton's laws of motion & Kepler's laws of planetary motion. CO2: Explain the law of conservation of Energy, Conservative forces, internal forces, and conservation of linear momentum, centre of mass, internal torque, angular momentum, moment of inertia, radius of gyration. CO3: Describe elastic and inelastic scattering, laboratory and centre of mass systems, scattering cross-section, Rutherford scattering. CO4: Explain the concept of Lorentz, Galilean transformations, relativity of simultaneity and Michelson-Morley experiment. CO5: Define and drive the length contraction, time dilation, relativistic addition of velocities, relativistic Doppler effect, relativistic momentum and energy, transformation of momentum and energy.
Electricity and Magnetism-I (PHY-112)	CO1: Understand and solve problems related to vector calculus including differentiation of vectors, curl of a vector field and its physical significance, Stokes' theorem, combination of grad, div and curl. CO2: Understanding the significance of electrostatic force, electrostatic field, electric flux and apply Gauss's theorem of electrostatics. CO3: Understand and explain the electric potential, potential difference, gradient of a scalar function, Gauss's theorem and differential form of Gauss's law, Laplacian and Laplace's equation, Poisson's equation. CO4: Describe magnetism, Ampere's circuital law and its applications. Hall Effect, Hall constant and its significance. CO5: Understand and explain surface current density and its use in calculation of change in magnetic field at a current sheet, dielectrics, molecular interpretation of Claussius- Mossotti equation, boundary conditions satisfied by E and D at the interface between two homogenous dielectrics.
Physics Laboratory-I (PHY-113)	CO1: Understand to use Vernier callipers, Screw gauge, Spherometer. CO2: Explain the concept of simple pendulum and moment of inertia. CO3: Classify the Young's modulus, modulus of rigidity. CO4: Able to use sextant to measure dimensions of unknown objects. CO5: Evaluate coefficient of viscosity of a given liquid by Stoke's method and determine its temperature dependence.
Basic Organic Chemistry (CHEM-111)	CO1: Understand the basic concepts of Organic Chemistry. CO2: Learn about different type of reagents and reaction intermediates used in chemical reactions. CO3: Get familiarize with the initial concepts of stereochemistry with special emphasis on optical isomerism, relative and absolute configurations. CO4: Acquire knowledge regarding geometrical isomerism and conformational isomerism. CO5: Gather information pertaining to the synthesis and chemical reactions of alkanes and cycloalkanes.

	CO6: Develop the understanding of practical knowledge and apply them in experiments.
Algebra (MATH-122)	CO1: Recognize different type of Matrices. CO2: Find out Eigen Values and Eigen Vectors CO3: Solve system of linear equations. CO4: Apply the knowledge of solving cubic and biquadrate equations in practical problems. CO5: Know the property of bilinear and quadratic forms.
Calculus (MATH-123)	CO1: Students will be able to understand limit, continuity, and able to apply differentiation in different type practical problems. CO2: They understand different properties of curves. CO3: Students will be able to draw different type Cartesian and polar curves. CO4: Students will be able to know how to calculate area, volume and length of different shapes.
Introduction to Computer Applications (COMP-101)	CO1: Know basic applications of computers in different organizations. CO2: Understanding, types of Computer systems like Micro, Mini, Mainframe and Super Computers. CO3: Understand about input and output devices, Data Processing and storage.
Communication Skills (ENG-102)	CO1: Learn basic about communication skills and its global importance. CO2: Develop speaking skills and learn English for national & international examinations and placements including IELTS, TOEFL. CO3: Develop reading and writing skills. CO4: Learn soft skills and interview skills.
B.Sc. Non-Medical Second Semester	
Thermodynamics and Statistical Physics (PHY-121)	CO1: Explain micro-states, macro-states, thermodynamic probability, Maxwell-Boltzmann statistics and phase space. CO2: Explain and drive the Plank's law of radiation, Wien's distribution law and Stefan's law from Plank's law. Able to compare the three statistics M-B, F-D and B-E. CO3: Describe and explain the laws of thermodynamics, working of Carnot's engine, change in entropy, and equation of state of ideal gas. Also the concept of heat death of universe. CO4: Explain Enthalpy, Gibbs, Helmholtz and Internal Energy function, Joule-Thompson Effect, Clausius- Clapeyron Equation, CO5: Explain the Statistical definition of entropy, change of entropy of system, additive nature of entropy, law of increase of entropy.
Electricity and Magnetism-II (PHY-122)	CO1: Describe dielectrics, moments of a charge distribution, Potential and field of a dipole, Atomic and molecular dipoles, Induced dipole moments. CO2: Explain magnetic forces, measurement of a charge in motion, invariance of charge, Electric field measured in different frames of reference. CO3: Describe magnetic field, vector field, Rowland's experiment and Hall effect. CO4: Explain the concept of electromagnetic induction, mutual inductance and impedance. CO5: Describe and understand the magnetic response of various substances to

	magnetic field, force on a dipole in an external field, magnetic permeability and susceptibility and their interrelation, electron spin and magnetic moment, types of magnetic materials and their properties.
Physics Laboratory-II (PHY-123)	CO1: Explain B-H curves for different ferromagnetic materials using C.R.O. CO2: Explain the concept low inductance by Maxwell-Wein bridge. CO3: Describe the temperature coefficient of resistance of Cu. CO4: Explain the functioning and working of He-Ne laser. CO5: Understanding of photoelectric effect, photocell.
Basic Inorganic Chemistry (CHEM-121)	CO1: Learn importance of de Broglie matter waves, Schrodinger wave equation and some important basic principles of atomic structure. CO2: Understand the principle of atomic, ionic radii, ionization energy, and electron affinity and electron negativity. CO3: Learn about chemical bonding, VBT theory, and hybridization and VSEPR theory. CO4: Understanding the chemical bonding and Molecular orbital theory. CO5: Understanding the ionic structures, radius ratio effects and coordination numbers.
Advanced Calculus (MATH-211)	CO1: Understand the concept of Continuity, Sequential continuity, properties of continuous functions uniform continuity CO2: Understand the basic knowledge of Chain rule of differentiability, Mean value theorems Rolle's theorem and Lagrange's mean value theorem and their geometrical interpretations. CO3: Application of Taylor's theorem with various form of remainders, Darboux intermediate value theorem for derivatives Indeterminate forms. CO4: Basic idea of Limit and continuity of real valued functions of two variables, Partial differentiation, Total differentials, Composite functions and implicit functions, change of variables, CO5: Application of Homogeneous functions and Euler's theorem on homogeneous functions. CO6: Application Taylor's theorem for functions of two variables Differentiability of real valued functions of two variables, CO7: Learn about Implicit function theorem, Maxima, Minima and saddle points of two variables, Lagrange's method of multipliers Curves, CO8: Learn about Tangents, Principal normal, Binomials, Serret-Frenet formulas, Locus of the center of curvature, Spherical curvature, Locus of center of spherical CO9: Learn about curvature, Involutes, Evolutes, Bertrand curves, Surfaces, Tangent planes, one parameter family of surfaces.
Ordinary Differential Equations (MATH-213)	CO1: Solve homogeneous and non-homogeneous linear differential equation and its application. CO2: Solve different type differential equations. CO3: Apply Variation of Parameter for solving differential equations. CO4: Apply Method of undetermined coefficient for solving differential equations. CO5: Apply Lagrange's Method for solving linear differential equation.

Environmental Science (EVS-301)	CO1: Understand the need for public awareness for environment. CO2: Learn about renewable and non-renewable resources, problems associated with Natural resources. CO3: Know about ecosystems, structure and function of an ecosystem. CO4: Understand biodiversity and impact on environment, conservations of bio resources. CO5: Understand about environmental pollution and causes and remedies.
B.Sc. Non-Medical Third Semester	
Vibrations and Waves (PHY-211)	CO1: Describe Simple harmonic motion, energy of a SHO, compound pendulum, electrical oscillations, plasma Vibrations, lattice vibrations, transverse vibrations of a mass on a string, CO2: Explain the decay of free vibrations due to damping, types of damping, Determination of damping coefficients – Logarithmic decrement, relaxation time and Q-factor CO3: Describe and explain the forced oscillator, transient and seady state oscillations, velocity versus driving force frequency, resonance, power supplied to forced oscillator by the driving force. Q-factor of a forced oscillator, electrical, nuclear and nuclear-magnetic resonances CO4: Explain the wave motion in one dimension, transverse and longitudinal waves, progressive harmonic waves and their energy, Transverse waves on a string, longitudinal waves on a rod, Electrical transmission lines, characteristic impedance of a string and a transmission line, CO5: Describe the reflection and transmission of transverse waves on a string at the discontinuity, energy considerations of reflected and transmitted waves, Impedance matching, Eigen frequencies and Eigen functions.
Electronics and Network Theory (PHY-212)	CO1: Describe and able to do the circuit analysis including series and parallel addition of V-I characteristics, KCL and KVL, Mesh and Node analysis, Superposition theorem, Thevenin‘s and Norton‘s theorem. CO2: Understanding about semiconductor materials and diode junctions, mobility and conductivity, generation and recombination of charges, diffusion. CO3: Describe the pnp and npn junction transistors, transistor current components, CB, CC and CE configurations, CO4: Describe construction and working of FET and MOSFETs. CO5: Explain the concept of rectifiers, filter circuits, efficiency, ripple factor, voltage multiplying circuits.
Physics Laboratory-III (PHY-213)	CO1: Describe the working of Ge, Si, LED and Zener diode. CO2: Understand the concept of voltage regulation and ripple factor. CO3: Classify the common emitter and common base transistors. CO4: Describe high resistance by leakage method. CO5: Explain the laws of probability and radioactivity.

Basic Physical Chemistry (CHEM-211)	CO1: Learn about gaseous state of matter, postulates of Kinetic theory of gases, critical phenomenon. CO2: Understand qualitative discussion of the Maxwell's distribution of molecular velocities and liquefaction of gases. CO3: Learn basic about chemical kinetics and its scope, factors influencing the rate of a reaction-concentration CO4: Understand the importance of second law of thermodynamics with statements, Carnot cycle and its efficiency, some impotant thermodynamic parameters in thermodynamics and their variation. CO5: Learn the physical significance of Free energy and work function, their variation with temperature and pressure, Maxwell relation and third law of thermodynamics.
Group and Rings (MATH-311)	CO1: Understand different type of theorems in algebra. CO2: Apply Group, Ring and Field theory in practical applications. CO3. Apply the knowledge of Groups and Rings in coding theory, quantum mechanics and many other fields. CO4: Understand about Unique Factorization Domain, Euclidean Domain and Principle Ideal Domain.
Real Analysis (MATH-313)	CO1: Understand about basic idea of integration of functions. CO2: Understand application of Mean value theorems. CO3: Analyze convergence and divergence of improper integrals through different tests. CO4: Apply this knowledge in boundedness, finite intersection property, compactness, connectedness, components, continuity in relation with continuity in relation connectedness in Metric Space.
Human Values and Ethics (EDU-101)	CO1: Understanding the need, basic guidelines, content and process of value education, self-exploration, continuous happiness and prosperity, fulfillment of basic aspirations of human being. CO2: Learn importance of universal human values and ethical human conduct, basis for holistic alternative towards universal human order CO3: Learn about Professional ethics and issues in professional ethics.
Punjabi Lazmi (PBI-111)	CO1: Learn basic about the Punjabi language. CO2: Lean writing of the Punjabi language. CO3: Be trained speaking in the Punjabi language
B.Sc. Non-Medical Fourth Semester	
Electromagnetic Waves and Optics (PHY-221)	CO1: Describe the Maxwell's equations, wave equation, e.m. waves in a medium with finite ε and μ, Plane waves, Energy flux. CO2: Explain the plane harmonic waves, linear, circular and elliptical polarization, natural light, production of polarized light, Malus law. CO3: Describe the theory of interference. Young's double slit experiment, Fresnel's Biprism, displacement of fringes CO4: Explain the Michelson's interferometer with its working principle. CO5: Explain Helmholtz Kirchhoff's integral, scalar diffraction theory, Fraunhoffer diffraction: single slit, circular aperture, diffraction grating, Rayleigh's criterion for resolution.

Quantum Mechanics (PHY-224)	CO1: Describe the reason behind origin of quantum theory including related phenomenon and experiments. CO2: Explain equation of motion of matter waves, Schrödinger equation and physical interpretation of wave function and its properties. CO3: Describe operator formalism in quantum mechanics. CO4: Solve problems in one dimension including potential step, rectangular potential barrier (tunnel effect) and infinite deep potential well. CO5: Describe spherically symmetric systems such as three-dimensional harmonic oscillator and hydrogen atom.
Physics Laboratory-IV (PHY-225)	CO1: Describe the specific rotation, refractive index, resolving power. CO2: Explain ionization potential of mercury. CO3: Classify the thermal conductivity and thermal diffusivity. CO4: Able to Measurement of the electrical and thermal conductivity of copper CO5: Explain the GM Counter, Stefan's Constant of radiation and temperature dependence of refractive index.
Numerical Methods (MATH-221)	CO1: Explain the consequences of finite precision and the inherent limits of the numerical methods considered. CO2: Select appropriate numerical methods to apply to various types of problems in engineering and science inconsideration of the mathematical operations involved, accuracy requirements, and available computational resources. CO3: Demonstrate they understand the mathematics concepts underlying the numerical methods considered. CO4: Demonstrate understanding and implementation of numerical solution algorithms applied to the following classes of problems: CO5: Apply different numerical techniques to solve real world problems through programming in C.
Vector Calculus (MATH-224)	CO1: They understand about scalar, vectors and their different properties. CO2: They will be able to apply different type operators in practical problems. CO3: They will be able to solve vector integration, CO4: Students will be able to apply Greens, Stokes and Divergence theorem. CO5: Students will be able to transform problems from one system to another.
Inorganic Chemistry-I (CHEM-221)	CO1: Explain importance of hydrides of nitrogen, nitrogen halides, oxides and oxyacid. CO2: Understand the principle of chemical reactivity and dioxygen as a ligand (basic idea only), structure of O_3 and H_2O_2, clathrate hydrates allotropic forms of S & Se, structures of halides. CO3: Learn about the halogen Family (chemical reactivity, group trends, chemistry of preparation of fluorine, hydrogen halides. CO4: Understanding the symmetry, group theory symmetry elements and symmetry operations. CO5: Describe the properties of irreducible representations and character tables.

Physical Chemistry-I (CHEM-222)	CO1: Describe kinetic theory of gases, understand transport properties and some important laws of diffusions. CO2: Understand thermodynamics of diffusion, relation between transport properties. CO3: Explain basic about equilibrium electrochemistry, some important laws, theories and application of conductometric titrations. CO4: Know dynamic electrochemistry, processes at electrodes, double layer at the interface, applications of dynamic electrochemistry in power generation, power storage (batteries). CO5: Enhance knowledge about chemical, kinetics of complex reactions, Importance of catalysts in kinetics.
B.Sc. Non-Medical Fifth Semester	
Atomic and Molecular Physics (PHY-322)	CO1: Describe the series in hydrogen, circular motion, nuclear mass effect, elliptical orbits, and energy levels. Fine structure, Sommer field and lamb shift. CO2: Explain doublet structure, Larmor's theorem and magnetic levels, elementary theory of weak and strong magnetic fields, Zeeman Effect. CO3: Describe systems with several electrons and spin functions, complex Spectra including LS-Coupling scheme and j-j coupling. CO4: Explain rigid rotator, energy levels, Raman effect, Quantum theory of Raman effect. CO5: Describe the non-rigid rotator: energy levels, spectrum, vibrating rotator energy levels, infrared and Raman spectrum. CO6: Describes the electronic spectra including electronic energy, potential curves, resolution of total energy, vibrational structure of electronic transitions, Deslandre's table, absorption sequences and vibrational analysis, rotational structure of electronic bands. CO7: Explain classifications of electronic states, orbital angular momentum, spin, total angular momentum of electrons, symmetry properties of electronic Eigen-functions.
Nuclear Physics (PHY-314)	CO1: Understand and explain nuclear mass formula, stability of nuclei, nuclear properties and binding energy. CO2: Enumerate and explain the Radioactive decays including modes of decay of radioactive nuclides and decay Laws, chart of nuclides and domain of instabilities. CO3: Understand and explain Alpha decay including stability of heavy nuclei against break up, Geiger-Nuttal law, barrier penetration as applied to alpha decay, reduced widths, deducing nuclear energy levels. CO4: Describe the types of nuclear reactions, cross-sections, reactions cross section, conservation laws, Kinematics of nuclear reaction CO5: Enumerate and explain nuclear shell Model and Magic Numbers

Physics Laboratory-V (PHY-316)	CO1: Describe the flashing and quenching of neon and argon bulb. CO2: Explain the hall coefficient and mobility of given semiconductor. CO3: Classify the Q-factor for different resistances. CO4: Understand the concept of clipping and clamping circuits. CO5: Explain and identify the series and parallel LCR circuits. CO6: Able to describes law of conservation of linear momentum in collision with initial momentum, using air track.
Partial Differential equations (MATH-312)	CO1: They will understand basic knowledge of Partial Differential Equations. CO2: Most of the real-world problems are formulated in Mathematical models, which are formulated in the form of partial differential equations. CO3: They will be able incorporate this knowledge in mathematical models. CO4: They will be able to classify partial differential equations and change into canonical form. CO5: Students will be able to solve one- and two-dimensional Heat equation, Wave equation and Laplace equations.
Statistics (STAT-311)	CO 1: They understand about static forces and its resolution. CO 2: They understand about equilibrium of forces. CO 3: They apply the knowledge of friction, Centre of gravity, virtual work in real life situation. CO4: They will understand about Stable and unstable equilibrium position. CO5: Students will be able to apply the knowledge of forces in three dimensions.
Inorganic Chemistry-II (CHEM-311)	CO1: Learn importance of coordination compounds, classical ligands, non-classical ligands and multidentate ligands. CO2: Understand the concept of isomerism in coordination compounds, nomenclature and stability of coordination compounds. CO3: Learn about the valence bond theory for bonding in coordination compounds, concept of multiple bonding, strength and weaknesses of valence bond approach. CO4: Understanding the splitting of d-orbitals in different fields for example octahedral and tetrahedral complexes. CO5: Understanding the concept of thermodynamic effects of crystal field splitting and enthalpies of hydration of M^{2+} ions.
Organic Chemistry-I (CHEM-313)	CO1: Learn the synthesis and chemical reactions of nitrogen and organo-sulphur compounds. CO2: Develop the understanding of five and six membered heterocyclic compounds along with condensed five and six membered heterocyclics. CO3: Recognize the importance and chemistry of saccharides, disaccharides and polysaccharides. CO4: Understand the difference between fats and oil, soaps and detergents and get acquaint with the synthesis of synthetic dyes. CO5: To know the chemistry related to amino acids, peptides, proteins and nucleic acids. CO6: Practice to perform single and multi-step organic reactions.

B.Sc. Non-Medical Sixth Semester	
Condensed Matter Physics (PHY-313)	CO1: Understand and describe the lattice, basis and primitive cell, symmetry operations, Bravais lattices, index system for crystal planes. CO2: Explain the reciprocal Lattice, Miller indices, Brillouin zone of sc, fcc and bcc lattices, Experimental diffraction methods, Bragg diffraction, scattered wave amplitude. CO3: Describe the cohesive energy and bulk modulus in inert gas and ionic crystal, Binding in metallic, covalent and H-bonded crystals (basic ideas only). Lattice Vibrations: Dynamics of monatomic and diatomic linear chains, optical and acoustic modes. CO4: Explain the Fermi Gas of non-interacting electrons, heat capacity of electron gas, electrical conductivity, Ohm's Law, Hall Effect, thermal conductivity and Pauli Paramagnetism. CO5: Explain and describe Bloch functions, Kronig-Penney model, bands in metals, semi-metals, semiconductors and insulators, Fermi surface-basic idea.
Particle Physics (PHY-324)	CO1: Describe the energy loss of electrons and positrons, positron annihilation in condensed media, stopping power and range of heavier charged particles, Bethe-Bloch formula, interaction of gamma rays with matter. CO2: Explain and discuss nuclear detectors and counters. CO3: Describe accelerators: linear accelerators, cyclic accelerators, ion sources, focusing, stability, electron synchrotron, colliding beam machines, particle beams for fixed target experiments, CERN Super Proton Synchrotron (SPS) and Fermi lab Tevatron. CO4: Describe elementary particles and types of interactions, quantum numbers and conservation laws, isospin, charge conjugation, Yukawa theory, Introduction to quarks and qualitative discussion of the quark model, high energy physics units. CO5: Explain particle properties and their reactions, CO6: Discuss and understanding of quark and qualitative description of quark model
Physics Laboratory-VI (PHY-326)	CO1: Explain the characteristics of LED, photodiodes, silicon and GaAs solar cells. CO2: Explain the concept of a stable multi-vibrator, working of LASER. CO3: Understanding of Michelson interferometer and its applications. CO4: Describe the mechanism behind the production of electronic charge by Millikan oil drop method. CO5: Classify the heat capacity of different given materials.
Dynamics (MATH-321)	CO1: Basic terminologies of Dynamics CO2: Understand General motion of a rigid body, and apply in practical problems CO3: Able ability to apply knowledge of Dynamics in science and engineering CO4: Be proficient in the use of mathematical methods to analyze the forces and motion a system. CO5: Be able to identify, formulate, and solve science and engineering problems.

Programming in C and Numerical Methods (MATH-324)	CO1: Student will understand about the basic concept of C language. CO2: They will apply C language in solution of different practical problems. CO3: Students will be able to solve problems through programming in C and also handling functions CO4: They will solve linear and nonlinear problems using C language. CO5: They will be able to solve Integration, and solution of ordinary differential
Physical Chemistry-II (CHEM-322)	CO1: Learn importance of quantum mechanics, failure of classical concepts and some important basic principles of quantum mechanics. CO2: Understand the behavior of particle in one and three dimensional box with translational energy, energy levels, quantization of energy and applications of particle in a box model. CO3: Learn about angular momentum, approximate Methods, operators used in quantum mechanics. CO4: Developing understanding for Valence-bond and molecular orbital approaches, electronic structures and pi-electron approximation.
Organic Chemistry-II (CHEM-323)	CO1: Learn importance of acyclic molecules, conformation, stericstereoelectronic effects and enantiomeric relationships. CO2: Understand the concept of free radical, carbanion nucleophile substitution reaction mechanism and regioselectivity. CO3: Learn about the alkylation of aldehydes, Favorskii rearrangements and aldol condensations. CO4: Understanding the concept of photochemistry, Jablonski diagram, inter-system crossing singlet and triplet states. CO5: Understanding the concept of concerted reactions, unimolecular rearrangement and elimination reactions.

Eternal University
Baru Sahib

B.Sc. (Hons) Microbiology

(Three Year Full-Time UG Programme)

Choice Based Credit System

Revised in July, 2022
(Effective from academic session 2022-2023)

DEPARTMENT OF MICROBIOLOGY
AKAL COLLEGE OF BASIC SCIENCES

B.Sc. (Hons.) Microbiology

PROGRAMME OUTCOMES (POs)

PO1 : To provide in-depth understanding of various disciplines of basic and applied microbiology.

PO2 : To prepare the learners to understand and solve real-life problems based on the knowledge of microbial sciences.

PO3 : To develop the skills required in various industries, research labs and academics so that the students can plan, perform, analyze and interpret the concept and data at their places of work.

PO4 : To develop the understanding of environment, ecosystem, sustainability, green energy and clean energy.

PO5 : To expose the students to various emerging areas of infectious diseases, molecular biology, microbial products, bioremediation etc. and prepare them for further studies and bright career in microbiology.

PO6 : To make the learners responsible citizens and professionals who have sensitivity towards societal issues and the capability of critical thinking, ethical attitude, decision making and independent analysis.

. PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1 : Understand the nature and basic concepts of human values, botany, zoology, chemistry, biochemistry, cell biology, genetics, ecology, English communication and computers.

PSO2 : Understand the basic concepts of origin of life, development of microbiology and it various disciplines.

PSO3 : Analyse the relationships among microbes, plants, animals, humans and environment.

PSO4 : Understand the principles/theory and procedural details of experiments in different areas of microbiology as per laboratory standards.

PSO5 : Understand the applications of water & soil microbiology, geo-microbiology, dairy & food microbiology, medical microbiology, industrial microbiology, environmental microbiology, microbial biotechnology and molecular microbiology.

PSO6 : Understand the properties, production and applications of antibiotics, probiotics, bacteriocins, microbial enzymes, microbial polysaccharides, biofuels, vaccines, recombinant biopharmaceuticals and other important microbial products.

COURSE OUTCOMES (COs)

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

Semester-I

BOT-101 **Introductory Botany** **LTP: 2+0+1**

CO 1: Understand the diversity of plants.
CO 2: Know the systematic, morphology, structure and life cycle of plants.
CO 3: Understand the structure and functions of plant tissues, roots, stems and leaves.
CO 4: Know about land plants bryophytes, gymnosperms and angiosperms.
CO 5: Learn about the economic importance of plants and their products.

ZOO-101 **Basic Zoology** **LTP: 2+0+1**

CO 1: Understand cell biology, genetics, taxonomy, physiology, ecology and applied zoology.
CO 2: Know about taxonomic rules on animal classification.
CO 3: Understand the distribution of fauna in different environments and animal diversity.
CO 4: Know about organs, organ systems and physiology of animals.
CO 5: Understand the concepts and mechanisms in developmental biology.

CHEM-111 **Basic Organic Chemistry** **LTP: 3+0+1**

CO 1: Understand the basic concepts of organic chemistry.
CO 2: Learn about different type of reagents and reaction intermediates used in chemical reactions.
CO 3: Get familiarize with concepts of stereochemistry and optical isomerism.
CO 4: Acquire knowledge regarding geometrical isomerism and conformational isomerism.
CO5: Gather information pertaining to synthesis and chemical reactions of alkanes and cycloalkanes.
CO 6: Develop the understanding of practical knowledge and apply them in experiments.

ENG-102 **Communication Skills** **LTP: 2+0+1**

CO 1: Improve the students' accuracy and fluency in English through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed.
CO 2: Enable students face competitive examinations such as GRE, TOEFL, IELTS, UPSC etc.
CO 3: Enhance student's ability to use English language accurately and effectively.
CO 4: Enable effective written communication and professional business presentation.
CO 5: Students will also exhibit advanced skills of interview, debating and discussion.

EDU-101 **Human Values and Ethics** **LTP: 1+0+1**

CO 1: Understanding the need, basic guidelines, content and process of value education, self-exploration, continuous happiness and prosperity, fulfilment of basic aspirations of human being.
CO 2: To learn importance of universal human values and ethical human conduct, basis for holistic alternative towards universal human order.
CO 3: To learn about Professional ethics and issues in professional ethics.

COMP-101 Introduction to Computer Applications LTP: 2+0+1

CO1: Understand the basic applications of computers in different organizations.
CO2: Understanding of Micro, Mini, Mainframe and Super Computers.
CO3: Know about input and output devices, data Processing and storage devices.
CO 4: Familiarize aboutstorage devices, computer networks and Operating Systems.

MICRO-211 General Microbiology LTP: 3+0+1

CO 1: Know the history and relevance of microbiology and classification of microorganisms.
CO 2: Understand the microbial diversity, their structures and functions.
CO 3: Understand the working principle and applications of microscope, autoclave, hot air oven, laminar air flow, BOD incubator, bio-safety cabinets and other instruments.
CO 4: Gain the skills of isolation of pure cultures of microbes and their staining methods.
CO 5: Acquire knowledge of sterilization, antiseptics, antibiotics, disinfection and microbial control.
CO 6: Understand the applications of microbes in human health, industries and environment.

Semester-II

EVS-301 **Environmental Science** **LTP: 3+0+0**

CO 1: Understand the need for public awareness for environment.
CO 2: Learn about renewable and non-renewable resources.
CO 3: Know about ecosystems, structure and function of an ecosystem.
CO 4: Understand biodiversity and impact on environment, conservations of bio resources.
CO 5: Understand about environmental pollution and causes and remedies.

CHEM-121 **Basic Inorganic Chemistry** **LTP: 3+0+1**

CO 1: Learn about de Broglie matter waves, Schrodinger wave equation and atomic structure.
CO 2: Understand the principle of atomic, ionic radii, ionization energy and electron negativity.
CO 3: To learn about chemical bonding, VBT theory and hybridization and VSEPR theory.
CO 4: To understand the chemical bonding and Molecular orbital theory.
CO 5: To understand the ionic structures, radius ratio effects and coordination numbers.

BIOCHEM-121 **Cell Biology** **LTP: 2+0+1**

CO 1: Identify different type of cells, their structure and biological functions.
CO 2: Understand the structure details of various organelles present in different cells.
CO 3: Interpret the structure of cell membrane, permeability and transport.
CO 4: Learn the functions and importance of cellular organelles and cellular structures.
CO 5: Know about cellular processes, metabolism and multiplication.

MICRO-212 **Bacteriology** **LTP: 3+0+1**

CO 1: Acquire knowledge of concept of origin of life and evolution of living organisms.
CO 2: Understand the diversity and habitats of bacteria and archaea.
CO 3: Acquire the knowledge of different phyla and groups of prokaryotes.
CO 4: Gain the skills of isolation of pure cultures of bacteria and their staining methods.
CO 5: Acquire knowledge of importance and significance of bacteria in environment.
CO 6: Understand the applications of bacteria in agriculture, human health and industries.

MICRO-122 **Field Microbiology-I** **LTP: 0+0+2**

CO 1: Learn the applications of microbiology in day-to-day life.
CO 2: Acquire awareness about microbial days and their importance.
CO 3: Know the diversity of microorganisms and their impact on different life forms.

PBG-102 **Fundamentals of Genetics** **LTP: 2+0+1**

CO 1: Understand the concept of heredity, genetics, genes and chromosomes.
CO 2: Acquire knowledge and practical skills of molecular genetic analysis of genetic diseases.
CO 3: Understand the concepts of Mendelian inheritance and multiple alleles.
CO 4: Know about genetics, genomics, PCR, gene therapy and molecular genetics.

Semester-III

STAT-201 **Statistics** **LTP: 4+0+1**

CO 1: Understand some basic concept to data sampling.
CO 2: Analyse statistical data graphically using frequency distributions.
CO 3: Analyse statistical data using measures of central tendency, dispersion and location.
CO 4: Translate real-world problems into probability models.
CO 5: Apply knowledge of mathematics, science, and engineering in design of experiments.

BIOCHEM-211 **Elementary Biochemistry** **LTP: 2+0+1**

CO 1: Understand about water, electrolyte, acid-base and structure of biomolecules.
CO 2: Understand the importance and significance of biological macromolecules.
CO 3: Describe the concept of metabolism and ATP production in living cells.
CO 4: Familiarize themselves with structures of carbohydrates, lipids, proteins and nucleic acids.

MICRO-213 **Mycology** **LTP: 3+0+1**

CO 1: Understand the diversity, distribution and forms of fungi in nature.
CO 2: Know about the beneficial and negative impact of fungi.
CO 3: Understands the morphology, metabolism and reproduction in fungi.
CO 4: Acquire the knowledge of fungi associations with other microbes, plants, animals and humans.
CO 5: Know the recent advancement in mycotechnology and fungal biotechnology..

MICRO-214 **Phycology** **LTP: 3+0+1**

CO 1: Know about diversity and significance of algae in different environments.
CO 2: Acquire knowledge of algae classification and important groups.
CO 3: Understand the interactions of algae with other microbes, plant and animals.
CO 4: Know about various commercial products obtained from different algal species.
CO 5: Learn about detrimental effects of algae on environment and other living organisms.

MICRO-215 **Virology** **LTP: 3+0+1**

CO 1: Understand the chemical nature and type of viruses and sub-viral particles.
CO 2: Acquire knowledge on classification of viruses on the basis of different criteria.
CO 3: Know the details of ultrastructure of common viruses.
CO 4: Understand the life cycle, replication, host ranges, virus-host interactions.
CO 5: Acquire knowledge of methods of cultivation, isolation and purification of viruses.

Semester-IV

MICRO-221 Industrial Microbiology LTP: 3+0+1

CO 1: Understand the role of microorganisms in different industries.
CO 2: Know about selection of superior microbial strains for the industrial processes.
CO 3: Gain knowledge of fermentation process, components of bioreactor and standard parameters.
CO 4: Understand about up-stream processing and down-stream processing of industrial fermentations.
CO 5: Know about important microbial products produced through industrial fermentation process.

MICRO-222 Soil and Agricultural Microbiology LTP: 3+0+1

CO 1: Understand the diversity of microorganisms occupying a wide range of ecological habitats.
CO 2: Get familiarize about interaction between soil microorganisms and plants species.
CO 3: Learn about various biogeochemical cycles occurring in soil and other environments.
CO 4: Acquire knowledge of beneficial microbes and their roles in agriculture.
CO 5: Develop understanding of mycorrizae, bio-fertilizers and their impact in agriculture crops.

MICRO-223 Environmental Microbiology LTP: 3+0+1

CO 1: Understand the basics concept of microbial diversity in different ecosystems.
CO 2: Know about role of microorganisms in bioremediation and waste treatment.
CO 3: Comprehend the various methods to determine the microbiological quality of water.
CO 4: Understand the role of microbes in solid waste treatment and associated bioprocesses.
CO 5: Acquire knowledge of advancements in environmental microbiology and microbial ecology.

MICRO-224 Food and Dairy Microbiology LTP: 3+0+1

CO 1: Understand the beneficial role of microorganisms in dairy and other fermented foods.
CO 2: Acquire knowledge of microbial involvement in spoilage of various food products.
CO 3: Understand the concepts of food preservation, food infections and food intoxications.
CO 4: Know about microbiology of various fermented foods.
CO 5: Acquire knowledge of aseptic packaging, GMP, HACCP and other food safety regulations.

MICRO-225 Field Microbiology-II LTP: 0+0+2

CO 1: Understand the relationship between microorganism, plants, animals and humans.
CO 2: Acquire knowledge of microbial concepts through experiential learning and societal interactions
CO 3: Understand the applications of microorganisms in human welfare.
CO 4: Gain the practical skills for microbiology experimentation and data analysis.

BIOCHEM-221 Introductory Enzymology LTP: 2+0+0

CO 1: Understand the basic concept of enzyme mediated reactions.
CO 2: Understand the mechanisms of enzyme catalysis.
CO 3: Acquire the knowledge of different methods used in enzyme kinetics.
CO 4: Understand the basic principles of enzyme inhibition.
CO 5: Acquire the knowledge of factors effecting enzyme mediated reactions.

Semester-V

MICRO-311 Microbial Physiology and Metabolism LTP: 3+0+1

CO 1: Get well versed with photosynthesis, respiration and fermentation, anaerobic respiration.
CO 2: Acquire in-depth knowledge of microbial growth kinetics and effects of environment.
CO 3: Get familiar with nitrogen fixation and assimilation of inorganic nitrogen by bacteria.
CO 4: Understand the concepts of autotrophy, heterotrophy, chemolithotrophy and photoautotrophy.

MICRO-312 Microbial Genetics LTP: 3+0+1

CO 1: Acquire in-depth knowledge of genetic material, plasmids and genome organization.
CO 2: Learn about replication, transcription, translation and gene expression regulation.
CO 3: Understand the process of mutations, genetic elements and genome evolution.
CO 4: Acquire knowledge of genetic code, wobble hypothesis and protein synthesis.
CO 5: Understand the concept of recombination, linkage mapping and horizontal gene transfer.

MICRO-315 Plant Pathology LTP: 3+0+1

CO 1: Understand the concept of plant pathogen, biotroph and necrotroph.
CO 2: Learn about common diseases of crop plants prevalent in different geographical areas of India.
CO 3: Gain knowledge of process and mechanism of establishment of plant diseases.
CO 4: Understand the life cycles of fungal, bacterial and viral plant pathogens.
CO 5: Understand the control strategies and management of plant pathogens.

MICRO-316 Medical Microbiology LTP: 3+0+1

CO 1: Understand the concept of pathogen, infection, disease, chemotherapy and prophylaxis.
CO 2: Know the composition, community structure and roles of normal microbiota of human.
CO 3: Understand the transmission, pathogenesis, lab diagnosis and control of pathogens.
CO 4: Able to use their knowledge for creating awareness about hygiene and vaccination in society.
CO 5: Understand the concept of antimicrobial resistance and antimicrobial chemotherapy.

MICRO-317 Parasitology LTP: 3+0+1

CO 1: Understand the concept of parasite, parasitism, vectors and neglected tropical diseases.
CO 2: Acquire knowledge of diseases caused by protozoan parasites and their prevention.
CO 3: Know about diseases caused by helminth parasites and their vectors/intermediate hosts.
CO 4: Understand host-parasite relationship, vector control and deworming practices.
CO 5: Acquire skills of identification, staining and isolation of parasites from clinical samples.

MICRO-318 Pharmaceutical Microbiology LTP: 3+0+1

CO 1: Know about microbes of relevant to healthcare and the pharmaceutical industry.
CO 2: Understand regulatory aspects, quality assurance and validation in microbiological labs.
CO 3: Learn about microbial contamination, product spoilage and preservation of pharmaceuticals.
CO 4: Understand disinfection, sterilization, sterility testing and pharmacopoeial standards.
CO 5: Acquire the knowledge of GLP, GMP, cGMP and GDocP practices.

Semester-VI

MICRO-323 Immunology LTP: 3+0+1

CO 1: Understand the historical development in immunology and concepts of immunity and vaccines.
CO 2: Know about lymphoid organs, immune cells and molecules involved in host immunity.
CO 3: Learn about interactions of antigens, antibodies, complements and other immune components
CO 4: Understand about types of immunity, long-term protection and immunization.
CO 5: Applications of antibody in diagnosis and therapy, and antigen-antibody reactions

MICRO-326 Microbial Biotechnology LTP: 3+0+1

CO 1: Understand the physiology, growth requirements and cultivation of microorganisms.
CO 2: Learn the concept of bioreactor, culture parameters and down-stream processing.
CO 3: Know about various industrial products made by microorganisms.
CO 4: Understand the role of microbes in agriculture, human health and environment
CO 5: Gain knowledge of microbial strain improvement and genetic engineering.

BIOCHEM-321 Principles of Instrumental Analysis LTP: 3+0+0

CO 1: Learn about different instruments used in biological studies.
CO 2: Understand the working principle of bioinstrumentation and biotechniques.
CO 3: Learn the skills required DNA isolation, PCR and molecular characterization.
CO 4: Acquire skills for performing electrophoresis, chromatography and centrifugation.
CO 5: Understand the methodology and applications of different blotting techniques.

BIOCHEM-325 Recombinant DNA Technology LTP: 3+0+0

CO 1: Understand the genome organization in prokaryotes and eukaryotes.
CO 2: Explain the concept of gene, operon, cistron, replisome, genetic code, translation and PCR.
CO 3: Learn about different cloning vectors and their specific applications.
CO 4: Acquire in-depth knowledge of restriction enzymes, genomic library and cDNA library.

MICRO-327 Biofertilizers and Biopesticides LTP: 2+0+1

CO 1: Understand the advantages of biofertilizers over chemical fertilizers.
CO 2: Know the mechanisms of microbe-mediated plant growth promotion.
CO 3: Learn the concept of antagonism, GM crops and bt-gene and biocontrol agents.
CO 4: Acquire skills to evaluate, develop and test different microbial preparations as biofertilizers.

BIOTECH-321 Bioinformatics LTP: 2+0+1

CO 1: Acquire the knowledge and awareness of DNA sequences, alignment and phylogeny.
CO 2: Learn the concepts of computational biology, mathematics and biology-related softwares.
CO 3: Understand data storage, data deposition and data retrieval from different databases.
CO 4: Knowledge of existing software effectively to extract information from large databases
CO 5: Learn about computer modeling, phylogenetic analysis and genome mining.

MICRO-302 Field Microbiology-III LTP: 0+0+2

CO 1: Acquire knowledge of microbiology through experiential learning and societal interactions
CO 2: Gain awareness of microbial impact in our daily life.
CO 3: Know about information dissemination about microbes through print media and social media.
CO 4: Gain the practical skills for microbiology experimentation and data analysis.

Programme: M.Sc. (Chemistry) (Two-year degree programme)

PROGRAMME OUTCOMES (POs)

PO1: Provide platform for the understanding of concepts, principles, theories and mechanisms related to chemistry.

PO2: Identifying and analyzing complex problems using research-based knowledge including design of experiments, analysis and interpretation of data.

PO3: Develop skills for chemical tools/software's required for the investigation and interpretation of data.

PO4: Create awareness about the impact of chemical processes on society and environment along with the need for sustainable development.

PO5: Motivation and support for research with special focus on interdisciplinary research.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: To clearly understand the concepts and applications in the field of Chemistry, environment along with computer applications.

PSO2: Students will be able to grasp the technological advancements in the usage of chemistry to analyse and design techniques/methods for variety of applications.

PSO3: Enable students for placement opportunities and to pursue career in an interdisciplinary areas in India as well as abroad.

PSO 4: Students will be able to develop and demonstrate knowledge of statistical tools used in chemistry.

PSO 5: Learners can also acquire practical skills to work as chemist, faculty and other industrial supporting services.

M.Sc. Chemistry First Semester	
Course	**Course Outcomes (COs)**
Basic Analytical Chemistry (CHEM-511)	**CO1:** Describe and compare a range of analytical chemistry methods and explain the underlying theoretical principles. **CO2**: Explain the broad role of analysts in quality control and assessment of experimental measurements from various application contexts. **CO3:** Employ a variety of analytical methods to prepare, separate and characterise samples from various matrices. **CO4:** As part of a team or individually, conducts, analyse and interpret results of a chemical analysis and effectively communicate these in written reports and other formats. **CO5:** Work safely and competently in an analytical laboratory setting.
Solid State Chemistry (CHEM-518)	**CO1:** To learn importance of X-ray Diffraction for Crystal Structure. **CO2:** To understand bonding in crystals, Band theory and Imperfections in crystal structures. **CO3:** To learn about Properties of crystals like thermal properties and optical properties. **CO4:** Developing understanding for general principles, experimental procedures, kinetics of solid state reactions.
Organo Transition MetalChemistry and InorganicPolymers (CHEM-512)	**CO1:** Understand the reaction pathways of substitution, oxidative addition, reductive elimination, insertion and elimination reactions. **CO2:** To learn the importance of homogeneous and heterogeneous catalysts in industrially accepted reactions. **CO3:** To know the role of transition metal catalysts in various oxidation reactions and phase transfer catalysis. **CO4:** Acquire the knowledge for the synthesis, properties and applications of polyphosphazenes, polysiloxanes and polsilanes.

Quantum Chemistry (CHEM-514)	**CO1:** To learn importance of quantum mechanics, failure of classical concepts and some important basic principles of quantum mechanics. **CO2:** To understand the behaviour of particle in one and three dimensional box with translational energy, energy levels, quantization of energy and applications of particle in a box model. **CO3:** To learn about angular momentum, approximate Methods, operators used in quantum mechanics. **CO4:** Developing understanding for Valence-bond and molecular orbital approaches, electronic structures and pi-electron approximation.
Mathematics for Chemist & Applications of Computer in Chemistry (CHEM-515)	**CO1:** Understanding general about computers, computer programming and basic mathematics with application in chemistry and solving problem by using computer programs. **CO2:** Learning basic structure and functioning of a computer, memory, architecture, I/O devices, etc. Familiarity with a computer. **CO3:** Learning basic mathematics and computer: Opening editing, compiling a file and running a programme. **CO4:** Enable students to be able to draw plots by using computer programming.
Practical (CHEM-516)	**CO1:** To understand the techniques used for gravimetric estimations and apply them in experiments. **CO2: E**xperimental learning of two and three step organic reactions**.** **CO3:** Adequate understanding and practice of physical parameters determination such as viscosity, surface tension, solubility and density.
	CO1: Understand the difference among aromatic, non-aromatic and anti-aromatic compounds along with basic mechanistic kinetic concepts. **CO2:** Develop the understanding regarding stability and reactivity of reaction intermediates accompanied by chemistry of elimination reactions.

Organic Chemistry (CHEM-517)	**CO 3:** To learn the chemistry pertaining to aromatic nucleophilic and electrophilic substitutions. **CO4:** To know the basic concepts and mechanisms related to aliphatic nucleophilic substitutions.
M.Sc. Chemistry Second Semester	
Bioinorganic Chemistry (CHEM-522)	**CO1:** To understand and compare the fundamentals and principles of bio-inorganic chemistry related to elementary cell biology. **CO2**: To know the role of different vitamins in the living beings followed by the merits and demerits of metals in medicine. **CO3:** To comprehend the properties of metalloenezymes and mechanism of photosynthesis. **CO4**: To understand the principles, mechanisms and importance of nitrogen fixation,nitrogenise enzymes, Nitrite reductase, nitrate reductase, nitrogen cycle and sulphur cycle.
Bioorganic Chemistry (CHEM-523)	**CO1:** To understand the fundamentals of amino acids and nucleic acids. **CO2**: To learn the various principles and mechanisms involved in metabolism and metabolic reactions. **CO3:** To know the importance and mechanism of fatty acids and lipids. **CO4:** To describe the preparation, properties and application of soaps and to explain the structure and importance of DNA and RNA. **CO5**: To develop the understanding related to chemical and enzymatic hydrolysis of nucleic acids, waxes and soaps.
Biophysical Chemistry (CHEM-528)	**CO1**: To understand the fundamentals of cell and its structure. **CO2:** To learn the various mechanism of membrane transport and osmosis. **CO3:** To know the importance and uses of amino acids and

	protines. **CO4:** To describe lipids in biological membranes, phospholipids, sphingolipids, glycolipids, cholesterol, gangliosides, lipoproteins, types and arrangements of proteins in membranes. **CO5:** To develop the understanding related to chemicaland enzymatic hydrolysis of nucleic acids and proteins
Surfactants, Macromolecules and Nano-materials (CHEM-524)	**CO1**: To understand the fundamentals of nanotechnology, application and its structure. **CO2:** To learn the various mechanisms of macromolecules and its use. **CO3:** To develop the understanding related to polymer and application of polymer. **CO4:** To understand the basic concept of thermodynamic and CMC.
Practical (CHEM-525)	**CO1:** To learn the measurements techniques involved in refractive index, conductometry, partition co-efficient and adsorption. **CO2:** Learn the methods for the preparation and estimation of colloidal solution and thermochemistry experiments. **CO3:** Experimental learning of multistep organic synthesis along with spectroscopic problems.
Organic Spectroscopy (CHEM-526)	**CO1:** To learn the basic concepts and techniques involved in IR spectroscopy. **CO2:** Understanding the importance of UV-Vis spectroscopy and its application in the study of organic compounds. **CO3:** To develop the understanding of 1H and C13 NMR along with its applications. **CO4:** To learn the principles and related mechanisms of mass spectroscopy.
	CO1: To know the application of stereochemistry in

Disconnection Approach in Organic Synthesis (CHEM-527)	organic synthesis. **CO2:** To understand the use and application of disconnection approach for organic synthesis. **CO3:** Learner will know the basic principles of green chemistry and application of non-conventional techniques in organic synthesis. **CO4:** To learn general synthesis of compounds with three or more heteroatoms in the ring
Computational Chemistry Lab (CHEM-529)	**CO1:** To learn the working of basic software used in chemistry. **CO2:** To get equipped with MS-Word. Power point, excel and statistical plotting. **CO3:** Learn to use the internet facility in the best possible way for research.
Synopsis Seminar (CHEM-591)	**CO1:** Learning how to pick a problem for their research project and provide latest facts and updated information by consulting latest editions of textbooks, reference books, monographs and peer-reviewed national & international research journals.
M.Sc. Chemistry Third Semester	
Research Methodology (RM-599)	**CO1:** The students would learn about various research methods used in research. **CO2:** To know how to do survey of literature in specific field and how to write synopsis for research proposal. **CO3:** To understand research as career; current status and future prospects of a specific research field. **CO4:** To learn experimental designs, sampling designs, recording of observation, measurement and scaling Techniques.

Main Group Chemistry and Inorganic photochemistry (CHEM-531)	**CO1:** Describe and compare a range of inorganic photochemistry and main group chemistry fundamentals and explain the underlying theoretical principles; **CO2**: Explain the broad role of photochemistry in quality control and assessment of experimental measurements from various application contexts; **CO3:** Employ a variety of analytical methods to prepare, separate and characterise samples from various matrices; **CO4:** As part of a team or individually, conduct, analyse and interpret results of a chemical analysis and effectively communicate these in written reports and other formats; **CO5:** Work safely and competently in an inorganic laboratory setting.
Advanced Statistical Thermodynamics and Symmetry (CHEM-533)	**CO1:** To understand the basics and laws pertaining to ideal gases. **CO2:** To get familiarize with the statistical basis of thermodynamics. **CO3:** To develop the understanding of thermodynamic properties of molecules from partition function. **CO4:** To know the symmetry elements and symmetry operations involved in group theory.
Electrochemistry and Molecular Reaction Dynamics (CHEM-534)	**CO1:** To understand the basics and laws of electrochemistry. **CO2:** To get familiarize with the statistical basis of thermodynamics. **CO3:** To develop the understanding of thermodynamic properties of molecules and molecular reaction. **CO4:** To know the electrochemistry and its application.

Current Trends in Organic Synthesis (CHEM-535)	**CO1:** To understand the classification, concepts and chemistry of pericyclic reactions. **CO2:** Learn the basic principles of photochemistry along with the photochemistry of alkenes, aromatic and carbonyl compounds. **CO3:** To develop the understanding of the chemistry of Aziridines, Azetidines, Indoles and azoles. **CO4:** Get familiarize with the preparation and applications of some reagents and reactions with mechanistic details.
Advanced Inorganic Chemistry (CHEM-536)	**CO1:** To learn the clusters in inorganic chemistry and carbonyl compounds. **CO2:** To understand the basics of advanced material chemistry. **CO4:** To study the synthesis of inorganic clusters. **CO2:** Experimental learning of TGA and DTA.
Natural Products **(CHEM-537)**	**CO1:** To learn the classification and methods for structure determination of terpenoids and carotenoids. **CO2:** To understand the basics, stereochemistry and structure determination of steroids **CO3:** To Develop the understanding regarding structure elucidation and classification of alkaloids. **CO4:** To study the synthesis of vitamins and antibiotics.
	CO 1: To learn the skills for the separation and purification

Practical (CHEM-538)	of organic compounds followed by the characterization. **CO2:** Experimental learning of some name reactions used in organic synthesis.
Credit Seminar (CHEM-539)	**CO1:** Learning how to pick a problem for their research project and to provide latest facts and updated information by consulting latest editions of textbooks, reference books, monographs and peer-reviewed national & international research journals.
M.Sc. Chemistry Fourth Semester	
Thesis (CHEM-600)	**CO1:** Students will learn how to work on a research topic assigned to him/her by their supervisor/mentor with a purpose to develop a collective approach to study, analyze and solve the problem.
Environmental Chemistry (CHEM-541)	**CO1:** Students willunderstand the chemistry of atmosphere. **CO2:** Students willunderstand different of instrumental method of water pollutants monitoring and analysis. **CO3:** To understand about prevention and control of air pollution. **CO4:** Students willknow about air Pollution monitoring and soil pollution.
Pesticides & Fertilizers (CHEM-542)	**CO1:** Students willunderstand the chemistry of pesticides and fertilizers. **CO2:** Students willunderstand different of instrumental method of pesticides monitoringanalysis. **CO3:** To understand about plant growth regulators. **CO4:** Students will know classification and types of fertilizers and their uses.
Advanced Organic	**CO1:** Students willunderstand about the chemistry of

Chemistry (CHEM-543)	pericyclic reaction and photochemistry. **CO2:** To understand about Franck-Condon Principle and Jablonski diagram in detail. **CO3:** To understand aboutPhotochemistry of azides and diazo compounds. **CO4:** Develop the understanding regarding stability and reactivity of reaction intermediates accompanied by chemistry of elimination reactions.
Advanced Physical Chemistry (CHEM-544)	**CO1:** Students willunderstand about the surface chemistry and terms used in surface chemistry. **CO2:** To know what is the importance of micelles in the soap and detergent industry**.** **CO3:** To understand about BET equation and adsorption isotherm. **CO4:** Describe and compare a range of electro chemistry methods and explain the underlying theoretical principles of electrochemistry.
Advanced Inorganic Chemistry-I (**CHEM-545)**	**CO1:** Describe and compare a range of advanced inorganic chemistry and explain the underlying theoretical principles ML bonding. **CO2**: Explain the broad role of non-aqueous solvents in the chemistry. **CO3:** To understand about magnetochemistry and radioactivity in detail. **CO4:** Explain the term paramagnetic and diamagnetic character of coordination compounds.
(CHEM-549) Project Work	**CO1:** Students will learn how to work on a research topic assigned to her by their supervisor with a purpose to develop a collective approach to study, analyze and solve the problem related to chemistry.

Department of Botany

Akal College of Basic Sciences

Learning Outcomes
Master of Science in Botany
(M.Sc. Botany)

ETERNAL UNIVERSITY
Baru-Sahib, Sirmaur (H.P.)

Eternal University, Baru Sahib (HP)
Master of Science (M.Sc. Botany)

Semester	Course code	Course name	L	T	P	C
I	BOT-511	Bryology	2	0	1	3
	BOT-512	Pteridology	2	0	1	3
	BOT-513	Gymnosperms	2	0	1	3
	BOT-514	Plant Resource Utilization	2	0	1	3
	BOT-515	Angiosperms: Phylogeny & Embryology	2	0	1	3
	BOT-516	Phycology	2	0	1	3
	BT-501	Cell &Molecular Biology	3	0	1	4
		Sub Total	**15**	**0**	**7**	**22**
II	BOT-521	Plant Anatomy	2	0	1	3
	BOT-522	Taxonomy of Angiosperms	2	0	1	3
	BOT-523	Cytogenetics& Plant Breeding	2	0	1	3
	BOT-524	Environmental Botany	2	0	1	3
	BOT-525	Mycology	2	0	1	3
	BOT-591	Synopsis Seminar	1	0	0	1
	BIOCHEM-522	Biochemistry and Molecular Biology of Plants	3	0	1	4
	BT-507	Plant & Animal Biotechnology	3	0	1	4
		Sub Total	**17**	**0**	**7**	**24**
III	BOT-531	Forestry	2	0	1	3
	BOT-532	Comprehensive Test & Field Botany	2	0	1	3
	BOT-533	Plant Pathology	2	0	1	3
	BOT-534	Plant Physiology	2	0	1	3
	BOT-591	Seminar	1	0	0	1
	BOT-599	Research Methodology	3	0	0	3
	BT-505	Computational Biology & Biostatics	3	0	0	3
	BT-513	Genetic Engineering	3	0	0	3
		Sub Total	**18**	**0**	**4**	**22**
IV	BOT-600	Dissertation	0	0	20	20
		Sub Total	**0**	**0**	**18**	**20**
Grand Total of All Semesters (I + II + III + IV)			**50**	**0**	**38**	**88**

Master of Science (Two-year degree programme)

PROGRAMME OUTCOMES (POs)

A transformed curriculum shall develop educated outcome-oriented candidature, fostered with discovery-learning, equipped with practice & skills to deal with practical problems, and versed with recent pedagogical trends in education including e-learning, flipped class, and hybrid learning to develop into responsible citizen for nation-building and transforming the country towards the future with their knowledge gained in the field of plant science.

PO1: Syllabus with a combination of general and specialized education shall introduce the concepts of breadth and depth in learning.

PO2: Shall produce competent plant biologists who can employ and implement their gained knowledge in basic and applied aspects that will profoundly influence the prevailing paradigm ofagriculture, industry, healthcare, and environment to provide sustainable development.

PO3: It will increase the ability to critically thinking, develop of scientific attitude, handling of problems and generate solutions, improve practical skills, enhance communication skills, and social interaction, and increase awareness of the judicious use of plant resources by recognizing the ethical value system.

PO4: The teaching/training provided to the students will make them competent enough for doing jobs in Govt. and private sectors of academia, research, and industry along with preparation for national as well as international competitive examinations, especially UGC-CSIR NET, UPSC Civil Services Examination, IFS, NSC, FCI, BSI, FRI etc.

PO5: Lifelong learning is achieved by drawing attention to the vast world of knowledge of plants and their domestication.

PROGRAMME SPECIFIC OUTCOMES (PSOs): M.Sc. – Botany

PSO1: Scientific knowledge and understanding of: Wide range of scientific disciplines concerned with the study of plants, which includes Bryology, Pteridology, Gymnosperms, Plant Resource Utilization, Angiosperms: Phylogeny & Embryology, Phycology, Cell &Molecular Biology, Plant Anatomy, Taxonomy of Angiosperms, Cytogenetics & Plant Breeding, Environmental Botany, Mycology, Biochemistry and Molecular Biology of Plants, Plant & Animal Biotechnology, Forestry, Comprehensive Test & Field Botany, Plant Pathology, Plant Physiology, Research Methodology, Computational Biology & Biostatics, Genetic Engineering.

PSO2: Practical skills: To write and conduct independent research under mentorship; To identify the diverse group of plants and their pathogens from the environment; To perform and present self before the challenging teaching and research problems; To carry out practical work, in the field and in the laboratory, with precaution and minimal risk; To conduct vegetation and biochemical analyses of plants; Knowledge of appropriate statistical methods and computer basics.

PSO3: Intellectual skills: To generate logical thinking to solve the problem in effective and practical manner; To assimilate knowledge and ideas to plan and conduct an independent project; To construct and test the hypothesis to execute the real problems of plant sciences.

PSO4: Use of modern scientific instruments & tools: Understanding of principle, procedure, methodology, application of instrumentation, their precaution and limitations. Use of modern instruments and equipment for Biochemical analysis & estimation, Molecular Biology, Biotechnology, Plant Tissue culture experiments, cellular and physiological activities of plants.

PSO5: Moral principles & ethics: To be morally responsible and ethical-conduct towards sustainability of biodiversity, environment and conservation.

COURSE OUTCOMES (COs)

Subject: Bryology **Subject Code: BOT – 511**

CO1: Understand the concepts and salient features of different taxonomic categories of bryophyta.
CO2: Demonstrate the structure and function of Antheridia and Archegonia in major taxonomic groups of bryophytes.
CO3: Understand the concepts related to evolution of sporophyte in bryophytes, conduction and water relations.
CO4: Demonstrate the epiphytes, epiphylls; epiliths litter species fire mosses, coprophilous species, calcicoles and calcifuges, halophytes, epizoic bryophytes.
CO5: Understanding the concept of dispersal of bryophyte diaspores, major patterns of bryophyte distribution.

Subject: Pteridology **Subject Code: BOT – 512**

CO1: Understand the concepts and salient features of different taxonomic categories of Pteridophyta.
CO2: Demonstrate the structure and function of comparative morphology of the sporophyte, stelar system, sporangial characteristics.
CO3: Understand the spore structure, types and patterns of spore germination in ferns.
CO4: Demonstrate the natural and induced apogamy and apospory in pteridophytes.
CO5: Understanding the utility concept of ferns for phytoremediation, ferns as hyper accumulators of arsenic, mechanism of uptake, transfer and tolerance.

Subject: Gymnosperms **Subject Code: BOT – 513**

CO1: Understand the concepts and salient features of different taxonomic categories of gymnosperms.
CO2: Demonstrate the distribution of gymnosperms with special reference to Indian members.
CO3: Understand the concepts of gymnosperms characteristics and their affinities with pteridophytes and angiosperms.
CO4: Demonstrate the vegetative morphology and reproductive organs of gymnosperms of Indian representatives.
CO5: Understanding the concept of comparative of analysis of various gymnosperm taxa on the basis of their distribution, morphology and reproductive structures.

Subject: Plant Resource and Utilization **Subject Code: BOT – 514**

CO1: Demonstrate the center of origin and uses of minor cereals, oil crops and legumes.
CO2: Understand the concepts related to psychoactive drugs and narcotics: source, botany, active principle and commercial significance.

CO3: Demonstrate the concepts related to medicinal plants and their classification with reference to obtained drugs.
CO4: Demonstrate the concepts related to aromatic plants and their classification with reference to obtained drugs.
CO5: Understanding the concept of uses of plant-based insecticides.

Subject: Angiosperms: Phylogeny & Embryology **Subject Code: BOT – 515**

CO1: Understand the concepts related to evolution and origin of Angiosperms.
CO2: Demonstrate the origin of monocot and dicots with reference to their relationships in evolutionary trends.
CO3: Understand the concepts related to development of male and female gametophytes.
CO4: Demonstrate the polyembryony.
CO5: Understanding the concept related to the development of embryo and their regulation of gene activity during embryogenesis.
CO6: Understanding the concept of the applied embryogenesis in vitro, embryo rescue in inviable crosses; Clonal multiplication, preservation of germplasm.

Subject: Phycology **Subject Code: BOT – 516**

CO1: Understand the concepts and salient features of different taxonomic categories of algae.
CO2: Demonstrate the structure and function of thallus organization in algae.
CO3: Understand the current concepts and relationships of prochlorophycean algae.
CO4: Demonstrate the rhythms and bioluminescence in dinoflagellates.
CO5: Understanding the economic importance of algae.

Subject: Cell & Molecular Biology **Subject Code: BT – 501**

CO1: Understand the concepts related to evolution of cell and biological macromolecules.
CO2: Demonstrate the structure and function of plasma membrane, molecular organization of cytoskeleton.
CO3: Understand the concepts related to chromosome organization, chromatin structure, complexity of eukaryotic chromosome.
CO4: Demonstrate the DNA replication in prokaryote and eukaryotes.
CO5: Understanding the concept transcription process in prokaryote and eukaryotes.
CO6: Understanding the concept of Cell division and cell cycle, cell-cell interaction, cell differentiation.
CO7: Evaluate concept of translation process, genetic code, and apoptosis.

Subject: Plant Anatomy **Subject Code: BOT – 521**

CO1: To acquaint the students with Structure and activity of vascular and cork cambia.
CO2: Demonstrate the xylem: constituents, differentiation of treachery elements.
CO3: Understand the concepts of phloem: constituents, differentiation of sieve elements and companion cells.
CO4: Understanding the concept related leaf and its variation in structure and Kranz anatomy.

CO5: Understanding the concept of seed coat anatomy with reference to legumes and cereals.
CO6: Understanding the concept related anatomy in relation to taxonomy, phylogeny and ecology

Subject: Taxonomy of Angiosperms **Subject Code: BOT – 522**

CO1: To acquaint the students with significance, aims and procedures of plant taxonomy; Alpha- and Omega- taxonomy; Biosystematics.
CO2: Demonstrate the herbaria practices, and Botanical gardens.
CO3: Understand the concepts of diagnostic keys, ranks of taxa and nomenclature of taxa according to their ranks.
CO4: Understanding the plant nomenclature and the International Code of Botanical Nomenclature (ICBN).
CO5: Understanding the concept of numerical taxonomy.
CO6: Understanding the Botanical Survey of India, its organization and role.

Subject: Cytogenetics & Plant Breeding **Subject Code: BOT – 523**

CO1: To acquaint the students with genomes organization in prokaryotes and eukaryotes.
CO2: Demonstrate the organization of plastid and mitochondrial genomes.
CO3: Understand the concepts of chromosome structure and DNA packaging, euchromatin and heterochromatin, karyotype analysis and banding patterns.
CO4: Understanding the enzymes involved in replication, polymerase, topoisomerase, methylase, nucleases and restriction endonucleases.
CO5: Understanding the concept of genetic recombination, and sex determination.
CO6: Understanding the concept of principles of plant breeding.

Subject: Environmental Botany **Subject Code: BOT – 524**

CO1: To acquaint the students to components and problems of environment, status of environment, its impact especially on plants.
CO2: Demonstrate the management and conservation of natural resources.
CO3: Understand the concept, level, measuring of biodiversity, significance in terms of economic, spiritual, scientific, educational, ecological and genetic values, the reasons for depletion, magnitude, distribution and conservation strategies.
CO4: Understanding the concept of ozone depletion.
CO5: Understanding the concept of weed ecology & management.
CO6: Understanding the concept related to allelopathy, and allelochemics.

Subject: Mycology **Subject Code: BOT – 525**

CO1: To acquaint the students with introduction to fungi and their significance to humans.
CO2: Demonstrate the characteristics of fungi and fungal systematic.
CO3: Understand the general account, structure and reproduction of Chytridiomycota, Myxomycota, Oomycota, Zygomycota, Ascomycota, Basidiomycota and mitotic fungi.
CO4: Understanding the concept related to rust and smut fungi.

CO5: Understanding the detailed account of the different orders with specific reference to *Saprolegnia, Achlya, Legninidium, Pythium, Phytophthora* and *Albugo*.

Subject: Synopsis Seminar **Subject Code: BOT – 591**

CO1: To acquaint the students with natural flora and fauna in various regions through field trips.
CO2: To organizing botanical excursions and visits to various herbaria and botanical gardens of the country.
CO3: Analyze effective application of management principles to diagnose and solve organizational problems and develop optimal managerial decisions.
CO4: Demonstrate the applicability of field report on the basis of their excursion tours.
CO5: Understanding the concept of field botany and their application in comprehensive test based on it.

Subject: Biochemistry & Molecular Biology of Plants **Subject Code: BIOCHEM–522**

CO1: To acquaint the students with structure and function of cell organelle.
CO2: Demonstrate the synthesis and transport of sucrose.
CO3: Understand the concepts of biochemistry of seed germination and development, biochemistry of fruit ripening, phytohormons and their mode of action, signal transduction.
CO4: Understanding the concept of nitrogen fixation and nitrate assimilation, sulphate reduction and incorporation of sulphur into amino acids.
CO5: Understanding the concept of biochemistry and significance of secondary metabolites.
CO6: Understanding the concept of molecular biology of various stresses.

Subject: Plant & Animal Biotechnology **Subject Code: BT – 507**

CO1: To acquaint the students with laboratory organization and tissue culture.
CO2: Demonstrate the protoplast isolation, culture and applications.
CO3: Understand the somaclonal variation, production of haploid plants, embryo rescue and wide hybridization, cell suspension culture, production of secondary metabolites, biotransformation, and cryopreservation.
CO4: Understanding the concept of vectorless and vector mediated transformation.
CO5: Understanding the concept of different types of culture media and cell cultures.
CO6: Understanding the concept related to In vitro fertilization, embryo transfer technology and animal cloning.

Subject: Forestry **Subject Code: BOT – 531**

CO1: To acquaint the students with silviculture.
CO2: Demonstrate the protection, causes and control of forest fires; Major diseases of forest plants.
CO3: Understand the concepts of forests types, climate of India, different climatic regions of India and central characters and distribution of the different forest types of India.

CO4: Understanding the concept of forest effects and economic value.
CO5: Understanding the concept of social and urban forestry.
CO6: Understanding the concept related to agroforestry.

Subject: Comprehensive Test & Field Botany **Subject Code: BOT – 532**

CO1: To acquaint the students with natural flora and fauna in various regions through field trips.
CO2: To organizing botanical excursions and visits to various herbaria and botanical gardens of the country.
CO3: Analyze effective application of management principles to diagnose and solve organizational problems and develop optimal managerial decisions.
CO4: Demonstrate the applicability of field report on the basis of their excursion tours.
CO5: Understanding the concept of field botany and their application in comprehensive test based on it.

Subject: Plant Pathology **Subject Code: BOT – 533**

CO1: To acquaint the students with history of plant pathology and pathogenesis.
CO2: Demonstrate the enzymes and toxins in plant diseases.
CO3: Understand the concepts of host parasite interaction, alteration in plant physiological functions and defense mechanisms in plants.
CO4: Understanding the concept of resistance and susceptibility, vertical and horizontal resistance, mutation, heterokaryosis, transformation, transduction and physiological specialization.
CO5: Understanding the concept of plant pathogens dispersal and diseases forecasting.
CO6: Understanding the concept related to cultural and chemical control, breeding for disease resistance.

Subject: Plant Physiology **Subject Code: BOT – 534**

CO1: To acquaint the students with recent concepts of structure and composition of membrane with various classes of pumps and their significance.
CO2: Demonstrate the plant respiration.
CO3: Understand the concepts of photosynthesis.
CO4: Understanding the concept related to nitrogen fixation by free and symbiotic organisms.
CO5: Understanding the concept of plant hormones.
CO6: Understanding the concept related to reproductive physiology, phytochrome/hormones in reproduction, stress physiology, secondary metabolites.

Subject: Seminar **Subject Code: BOT – 591**

CO1: To acquaint the students with natural flora and fauna in various regions through field trips.
CO2: To organizing botanical excursions and visits to various herbaria and botanical gardens of the country.

CO3: Analyze effective application of management principles to diagnose and solve organizational problems and develop optimal managerial decisions.
CO4: Demonstrate the applicability of field report on the basis of their excursion tours.
CO5: Understanding the concept of field botany and their application in comprehensive test based on it.

Subject: Research Methodology **Subject Code: BOT – 599**

CO1: Understanding the concept of research, research applications in functional areas of business and emerging trends in Botany research.
CO2: Elaborate the scientific method of research, formulation of research projects, steps in research process and preparation of synopsis.
CO3: Understanding the qualities of a good hypothesis and concept of hypothesis testing and test of significance.
CO4: Understanding MS word, MS excel, and MS PowerPoint, graph and figure plotting.
CO5: Elaborate the concept & need of sampling and types of sampling.
CO6: Understating scaling techniques and types of data.
CO7: Understanding the data analysis, graphical representation of data and writing of manuscripts.

Subject: Computational Biology & Biostatics **Subject Code: BT – 505**

CO1: To acquaint the students with definition of biostatistics, concept of variables in biological systems, collection, classification, tabulation, graphical and diagrammatic representation of numerical data, measure of central tendency, measure of dispersion, correlation and regression, linear and quadratic regressions, concept of standard errors.
CO2: Demonstrate the Test of significance based on Z, $\chi 2$, t and F statistics, correlation and regression, curve fitting by least squares methods.
CO3: Understand the concepts of protein and gene information resources.
CO4: Understanding the concept of global and multiple sequence alignment, multiple sequence alignment using FASTA, Sequence alignment using CLUSTAL W, BLAST and PSI BLAST.
CO5: Understanding the concept of gene finding algorithms and software's.
CO6: Understanding the concept related to protein-Protein interactions, proteomics, protein microarrays chips and data analysis.

Subject: Genetic Engineering **Subject Code: BT – 513**

CO1: To acquaint the students with scope and milestones in genetic engineering and different Cloning vectors.
CO2: Demonstrate the extraction, purification and analysis of mRNA from eukaryotic cells.
CO3: Understand the concepts of Construction and screening of genomics and cDNA libraries.
CO4: Understanding the concept related to polymerase chain reaction and its variants.
CO5: Understanding the concept of expression in heterologous systems, vector engineering and codon optimization, expression of cloned genes in *E. coli*, yeast, insect, plants and mammalian cells.
CO6: Understanding the concept related to Genetic manipulation of higher animals and plants.

Subject: Dissertation **Subject Code: BOT – 600**

CO1: To acquaint the students with dissertation work.
CO2: Demonstrate the research topic assigned.
CO3: Understand the concepts of given research topic and analyze and solve the problem.
CO4: To submit thesis for evaluation of students and they required to collect, analyze the data and submit their dissertation.

Course outcomes: BOT-524

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

CO1:Learn basic principles, handling, and working of various analytical techniques used in plant biology.
CO2: Understand the working of various bio-instruments i.e., microscopy, spectroscopy, chromatography, PCR and NGS techniques.

Course outcomes: BOT-542
After the completion of the course, the students will be able to:
CO1:Understand the characteristics, importance, and application of biofertilizers in the improvement of the growth and development of plants.
CO2: Learn the physiology, biochemistry, and molecular genetics of symbiosis; concept of enzymes; production and application technology; extension promotion and marketing of biofertilizers.

Course outcomes: BOT-534
After the completion of the course, the students will be able to:
CO1: Gain a working knowledge of the practical and theoretical concepts of plant biology with information technology.
CO2: Understand the use of statistics in data analysis experimental design, hypotheses testing, and biomolecule sequence predictions and interactions.

Courses Offered by Department of Mathematics for Program Outcome of M.Sc. (Mathematics)

Program Outcomes, Program Specific Outcomes, Course Outcomes

Program Outcomes	**Program Outcome of M.Sc. Mathematics**
PO 1.	Knowledge of advanced methods of mathematics, including some from the research frontier of the field, and expert knowledge of a well-defined field of study, based on recent trends of research in mathematics
PO 2.	Analysing, Mathematical Modelling and logical arguments power will be developed with mathematical concepts.
PO 3.	Communicate mathematical ideas with clarity and coherence,both written and verbally.
PO 4.	Perform research in conjunction with others as well as individually.
PO 5.	Enhance the job prospect
Program Specific Outcomes	**PSOs of M.Sc. Mathematics Program**
PSO 1.	After completing the program student will be able to write Dissertation/Project work in Mathematics
PSO 2.	They will be able to write computer program for solve real world problems.

Courses Offered by Department of Mathematics for Program Outcome of M.Sc. (Mathematics)

Program Outcomes, Program Specific Outcomes, Course Outcomes

Course Outcomes	**Analysis - I (MATH-521)** **CO 01:** Understand thing of Uncountability of the reals. Metric spaces, compact and connected sets, separability, equivalent metrics. **CO 02:** Understanding of Subsequences. Cauchy sequences. Upper and lower limits of a sequence of real numbers. Series, absolute convergence and rearrangement of series. **CO 03:** Idea of Limits of functions (in metric spaces) and continuity. **CO 04:** Understanding the concept of Continuous functions on compact domains and on connected domains. **CO 05:** Knowledge about Discontinuities and monotonic functions on intervals. **CO 06:** Integration of vector-valued functions and rectifiable curves., Uniform convergence of sequences and series of functions, its relation to continuity, integrability and equicontinuity. **CO 07:** Application of Stone-Weierstrass theorem.
Credits	LTP:3/1/0
Course Outcomes	**Complex Analysis (MATH-522)** **CO 01:** Effectively write mathematical solutions in a clear and concise manner. **CO 02:** Effectively locate and use the information needed to prove theorems andestablish mathematical results. **CO 03:** Demonstrate the ability to integrate knowledge and ideas of complex differentiation and complex integration in a coherent and meaningful manner and use appropriate techniques for solving related problems and for establishing theoretical results. **CO 04:** Demonstrate ability to think critically by proving mathematical conjecturesand establishing theorems from complex analysis. **CO 05:** In addition, students will be able to: Operate with complex numbers, use the complex derivatives function, use and operate analytic functions, demonstrate knowledge of integration in the complex plane. **CO06:** Students apply Cauchy's theorem and Cauchy integral formula inpractical problem. **CO 07:** Manipulate and use power series, understand residues and their use in integration. **CO 08:** Demonstrate the understanding of conformal mappings.

	CO 06: Students apply Cauchy's theorem and Cauchy integral formula in practicalproblem. **CO 07:** Manipulate and use power series, understand residues and their use inintegration. **CO 08:** Demonstrate the understanding of conformal mappings.
Credits	LTP:3/1/0
Course Outcomes	**Algebra (MATH-523)** **CO 01:** Student will get the knowledge about the groups, permutation group. **CO 02:** Student will get the knowledge about Jordan Holder series, nilpotent group, simple group, solvable group. **CO 03:** Students will get the knowledge about the rings, integral domain, polynomial ring **CO 04:** Students will apply their knowledge in the area principal ideal domain, unique factorization domain.
Credits	LTP:3/1/0

Courses Offered by Department of Mathematics for Program Outcome of M.Sc. (Mathematics)

Program Outcomes, Program Specific Outcomes, Course Outcomes

Course Outcomes	**Numerical Methods (MATH-524)** **CO 01:** They will be able to find roots of linear and nonlinear algebraic and transcendental equations using different numerical methods **CO 02:** They get knowledge about solution of a system of non-linear equations byfixed point method and Newton-Raphson methods. **CO 03:** Analyze the rate and order of Convergence of different numerical methods. CO 04: Application of of differential equations in real life and solution of initial-value problem by single and multistep methods such as Taylor series, Euler's, Euler's modified, Picard, Runge-Kutta, Predictor-Corrector, Milne-Thomson. **CO 05:** Application of differential equations in Science and Technology. Solution of linear and non-linear boundary-value problems, Rayleigh-Ritz, Galerkin, Shooting methods, Solution of Characteristics value problems, **CO 06**: Application and solution of Laplace and Poisson equations in two variables byfive point formula, Solution of Laplace equation in two variables by ADI method, Solution of mixed boundary value problem, **CO 07:** Solution of problems using Computer Algorithm for elliptic equation in three variables, Solution of parabolic partial differential equation in two variables by explicit and implicit methods. **CO 08:** Idea of solution of parabolic equation in three variables by different method such as ADE and ADI methods. **CO 09:** Knowledge about Solution of hyperbolic equation in two variables by explicit and implicit methods and algorithm for hyperbolic equation in three variables, **CO 10:** Idea about Stability of finite difference schemes for parabolic and hyperbolic equations
Credits	LTP:3/0/1
Course Outcomes	**Ordinary Differential Equations (MATH-525)** **CO 01:** Understand the concepts of real function theory. **CO 02:** Study of existence and uniqueness theorem for higher-order equations, **CO 03:** Basic knowledge of Homogeneous Linear System and Non homogeneous Linear System. **CO 04:** Application of Sturm-Liouville Problems. **CO 05:** Knowledge about Orthogonality of Characteristic Functions and expansion of function in orthonormal form. **CO 06:** Analyze separation theorem, Sturm's fundamental theorem Modification due to Picone, Conditions for Oscillatory or non-oscillatory solution. **CO 07:** Study of First and Second comparison theorems. **CO 08:** Application to Sturm Liouville System, Phase Plane, Paths, and

	Critical Points. Critical Points and paths of Linear Systems. **CO 09:** Understand the Critical Points and Paths of Nonlinear Systems. Limit Cycles and Periodic Solutions.

	CO 03: Basic knowledge of Homogeneous Linear System and Nonhomogeneous Linear System. CO 04: Application of Sturm-Liouville Problems. CO 05: Knowledge about Orthogonality of Characteristic Functions and expansion of function in orthonormal form. CO 06: Analyze separation theorem, Sturm's fundamental theorem Modification due to Picone, Conditions for Oscillatory or non-oscillatory solution. CO 07: Study of First and Second comparison theorems. CO 08: Application to Sturm Liouville System, Phase Plane, Paths, and Critical Points. Critical Points and paths of Linear Systems. CO 09: Understand the Critical Points and Paths of Nonlinear Systems. Limit Cycles and Periodic Solutions.
Credits	LTP:3/1/0
Course Outcomes	**Analysis - II (MATH-531)** **CO 01:** Student will understand about linear transformation from one space toanother space. **CO 02:** They will understand the inverse function theorem, implicit functiontheorem and also gain the basic idea of matric space. **CO 03:** Student will analyze the measurable theory and apply in practical problems **CO 04:** They will understand the integration and differentiation of measurable functions. **CO 05:** Student will analyze the convergence and divergence in measure.
Credits	LTP:3/1/0
Course Outcomes	**Programming In C (MATH-533)**

	CO 01: Student will understand about basic concepts, algorithm and flow chart in C language. **CO 02:** They will apply different loops in practical problems. **CO 03:** They will apply arithmetic expression in different problems.**CO 04:** Student will understand about data type and functions. **CO 05:** They will apply logical expressions and control statements in practicalproblems **CO 06:** Student will apply bit level operation and application of pointer.
Credits	LTP:3/0/1
Course Outcomes	**Curves and Surfaces (MATH - 535)** **CO 01:** Students will be able to understand basic concept of curves in R^2 and R^3. **CO 02:** They will apply arc length, reparametrization, Curvature, torsion and Serret-Frenet formula in real life problems. **CO 03:** They will understand about first and second fundamental theorems. **CO 04:** Student will understand about Geodesics curvature and Gauss's theorem **CO 05:** They will apply the knowledge to calculate area, volume integrals, and surface area.
Credits	LTP:3/1/0
Course Outcomes	**Algebra-II(Math-534)** **CO 01:** Students will get the knowledge about their reducible criteria about polynomial ring. **CO 02:** Students will get the knowledge about field, primefield, sunfield, algebraic extension, finite field extension **CO 03:** Student will get the knowledge about normal extension, inseparable extension **CO 04:** Students will get the knowledge about the field module, submodule, linear operator, characteristic polynomial, minimal polynomial.

Courses Offered by Department of Mathematics for Program Outcome of M.Sc. (Mathematics)

Program Outcomes, Program Specific Outcomes, Course Outcomes

Course Outcomes	**Partial Differential Equations (MATH-551)** **CO 01**: Understand the Classification of Second order Partial Differential Equations. **CO 02:** Conversion of PDE in Canonical forms: Canonical form for Hyperbolic equation, Canonical form for Parabolic equation, Canonical form for elliptic equation. **CO03:** Analysis and Derivation of Laplace Equation, Derivation of Poisson equation. **CO 04:** Application of Boundary Value Problems. Some important mathematical tools. Properties of Harmonic Functions. **CO 05:** Students will understand the DiracDelta Function. **CO 06:** Application and solution of one dimensional, and two dimensional Heat and Wave equation by variable separation method. **CO 07:** Application and Analysis of Initial Value Problem; D'Alemberts Solution. Vibrating String – Variables Separable solution, Forced Vibrations – Solution of Nonhomogenous Equation. **CO 08:** Study of Boundary and Initial Value problem for one and two-dimensional Wave equation in Cylindrical Coordinates and Spherical Polar Coordinates.
Credits	LTP:3/1/0
Course Outcomes	**Mathematical Statistics (MATH-552)** **CO 01:** Effectively express themselves in statistical terms either in written or oralform. **CO 02:** Demonstrate ability to integrate knowledge and idea in a coherent and meaningful manner by implementing the basic regression analysis theory in solving"real world" problems. **CO 03:** Locate and use information from the output of statistical software to drawconclusion. **CO 04:** Work effectively with others in class discussions or small group projects. **CO 05:** To understand the mathematical theory behind common methods of statisticalinference, such as point estimation, confidence intervals, and hypothesis testing. **CO 06:** To apply statistical methods learned to help solve interesting and realisticproblems across a variety of fields. **CO 07:** Introductory probability and Bayes' theorem **CO 08:** Discrete random variables and their probability distributions **CO 09:** Continuous random variables and their probability distributions **CO 10:** Multivariate random variables and their probability distributions

	CO 11: Sampling distributions and the central limit theorem Interval estimation
Credits	LTP:3/1/0

Course Outcomes	**Research Methodology (MATH -599)** **CO 01:** Student will understand about ethics of research. **CO 02:** They will understand how to collect data or literatures. **CO 03:** They will apply different statistical tools in their research work.**CO 04:** Student will understand about citation of work and plagiarism. **CO 05:** Student will understand about different experimental design such as CRD,RBD and Latin square design. **CO 06:** Student will apply their knowledge to write the synopsis, research paper andthesis.
Credits	LTP:3/0/0
Course Outcomes	**Discrete mathematics (MATH-533)** **CO 01:** Student will understand about basic concept of set theory and relations. **CO 02:** They will apply the knowledge in practical problems such as AND, OR,NOR gates etc. **CO 03:** Student will be able to understand about permutation, combination. **CO 04:** They will apply Pigeonhole principle in real life practical problems, **CO 05:** Student will understand about graph theory and apply this knowledge tosolve practical problems. **CO 06:** They will understand about Boolean algebra and apply the circuit theory insolution of complicated problems. **CO 07:** They will get knowledge about trees and application in real life problems.
Credits	LTP:3/1/0
Course Outcomes	**TOPOLOGY (MATH - 561)** **CO 01:** Student will understand about basic concept of set theory and metric space. **CO 02:** They will understand about Topological Spaces, examples and its application.

	CO 03: Student will anlyze different type space such as compact, connected,Housdorff, and separated space **CO 04:** They will understand different type theorems such as Urysohn's lemma, Urysohn imbedding, Tietze's extension, and Stone-Cech compactification theoremsetc. **CO 05:** They will understand about different shapes.
Credits	LTP:3/1/0
Course Outcomes	**Functional Analysis (MATH-563)** **CO 01:** Student will understand about Normed linear space and Banach space and itsapplications. **CO 02**: They will analyse Hahn-Banach, Banach-Steinhaus, Open Mapping andClosed Graph Theorems. **CO 03:** Student understand about dual spaces and reflexivity, weak and weak starconvergence. **CO 04:** They will be able to understand different type operators such as adjoint operator, self-adjoint, normal and unitary operators on Banach and Hilbert spaces.
Credits	LTP:3/1/0
Course Outcomes	**Number theory-I (MATH- 562)** CO-01: Students will get the knowledge about divisibility, g.c.d. the fundamentaltheorem of arithmetic. CO-02: Students will gain the knowledge in the field Chinese remainder theorem,Fermat's theorem, and Wilson's theorem. CO-03: students will check their knowledge in the field residue class, Euler'stheorem. CO-04-students will gain the knowledge in the field quadratics residue, Legendresymbol, jacobi symbol, Diophantine equation.

Courses Offered by Department of Mathematics for Program Outcome of M.Sc. (Mathematics)

Program Outcomes, Program Specific Outcomes, Course Outcomes

Credits	LTP:3/1/0
Course Outcomes	**Difference Equation (MATH-564)** **CO 01:** Students will be able to apply Euler's summation formula and Bernoulli polynomials in practical problems. **CO 02:** Students understand about linear and non-linear difference equations and beable to solve. **CO 03:** Students will be able to analyze the stability of linear and Nonlinear system. **CO 04:** Students will understand Volterra summation equation and Fredholm summation equation. **CO 05:** Students apply Z-Transform as a mathematical tool for solving difference equation.
Credits	LTP:3/1/0
Course Outcomes	**Coding Theory (MATH-565)** **CO 01:** They understand about linear code and encoding and decoding techniques. **CO 02:** They will apply this technique to remove noisy data. **CO 03:** Students will be able to apply this technique in security analysis. **CO 04:** They understand about Hamming code, perfect code and Latin square
Credits	LTP:3/1/0
Course Outcomes	**Non-Commutative Rings (MATH-566)** **CO 01:** Student will understand basic knowledge about rings, module and sub-module theory. **CO 02:** Student will analyze direct sums and direct products of rings and modules and its application. **CO 03:** They will understand Injective modules and divisible modules **CO 04:** Student will apply the knowledge of module theory in coding and decoding theory and security system etc.

Courses Offered by Department of Mathematics for Program Outcome of M.Sc. (Mathematics)

Program Outcomes, Program Specific Outcomes, Course Outcomes

Credits	LTP:3/1/0
Course Outcomes	**Calculus of Variations and Analytical Mechanics (MATH-567)** **CO 01:** Students understand about Euler's equation and its application. **CO 02:** They apply Generalized coordinates, Holonomic and Non-Holonomicsystems in physical problems. **CO 03:** Students understand about Lagrange's equations of first and second kind andChoice of Lagrangian. **CO 04:** Students will be able to apply Lagrange brackets and Poisson brackets under canonical transformations.
Credits	LTP:3/1/0
Course Outcomes	**Operations Research (MATH568)** **CO 01:** Understand the basic definitions and the properties of Hyperplane and hyperspheres, convex sets convex, concave functions and their properties. **CO 02**: Formulate the problem in Mathematical form and solve the Linear programming problem using different existing method. **CO 03:** Mathematically formulate and solve Transportation and Assignment problems. **CO 04:** Formulate mathematical model in Goal Programming and be able to solve using existing method. **CO 05:** Understand the concept of Duality and be able to solve by Dual simplex algorithm. **CO 06:** Apply different existing method to solve integer programming problem. **CO 07:** Apply Game theory to make decision in practical managerial problems. **CO 08:** Able to find shortest path of Spanning tree. **CO 09:** Able to solve Maximal flow problem.

Courses Offered by Department of Mathematics for Program Outcome of M.Sc. (Mathematics)

Program Outcomes, Program Specific Outcomes, Course Outcomes

Course Outcomes	**Nonlinear Optimization (MATH 571)** **CO 01:** Understand convex hulls, Closure and interior of a set, Separation and support of sets, Separation theorems of convex sets, convex cones and polarity, polyhedral sets, Extreme points and extreme directions **CO 02:** Knowledge of definitions and Basic properties of convex functions generalized convex functions, Differentiable convex functions, twice differentiable convex functions. **CO 03:** Able to find Minima and Maxima of Convex functions. **CO 04:** Apply Fritz Johnand Karush-Kuhn-Tucker optimality conditions for solving non linear programming problem. **CO 05:** Able to solve Linear quadratic programs.
Credits	LTP:3/1/0
Course Outcomes	**Number theory-II (MATH-572)** **CO 01**: Students will gain the knowledge in the field Farey sequence, continued fraction, pell's equation, Minkowski's inequality. **CO 02**: Students will check their knowledge in the field of the prime number theorem, Euler summation formula, and Abel's identity. **CO 03:** Students will get the knowledge about the practical problems related to Fermat's theorem, Wilsion's theorem, Chinese remainder theorem.
Course Outcomes	**Non Commutative Rings (MATH-566):** **CO 01:** Students get knowledge about basic concepts of non commutative rings. **CO 02**: They understand about modules and submodules. **CO 03:** They understand about Artinian rings, Wedderburn-Artin theorem. **CO 04:** Students will understand basic concept of injective hulls.
Credits	LTP:3/1/0

Courses Offered by Department of Mathematics for Program Outcome of M.Sc. (Mathematics)

Program Outcomes, Program Specific Outcomes, Course Outcomes

Course Outcomes	**Commutative Algebra (MATH-573)** **CO 01:** They understand about prime, semi-prime, primary, maximal in ring theory **CO 02**: Student will analyze Chinese reminder theorem for solution algebraic equation and also in factorization of numbers. **CO 03:** They will understand about Chain conditions, maximal and minimal conditions in noetherin ring theory. **CO 04:** Student understand about applications to principal ideal domains andArtinian rings
Course Outcomes	**Algebraic Topology (Math-574)** **CO 01:** Student will understand about definition and some examples of homotopies and its applications. **CO 02:** They will analyze fundamental group of a space and the effect of acontinuous mapping on fundamental group. **CO 03:** Student will understand about projection of space and torus,homomorphisms and automorphisms of covering spaces. **CO 04:** They will understand about Brower fixed-point theorem in two dimensions.
Credits	LTP:3/1/0
Course Outcomes	**Fuzzy set theory and application (MATH 575)** **CO 01:** Understand basic definitions of fuzzy set and their properties **CO 02:** They will know about Fuzzy numbers and relation between fuzzy number and a convex fuzzy set Operations on fuzzy numbers in terms of its membership functionsas piecewise defined functions, fuzzy cardinality of a fuzzy set using fuzzy numbers,arithmetic operators on fuzzy numbers **CO 03:** Able to solve fuzzy equations, equation A+X = B, equation A.X = B **CO 04:** Know about Crisp and fuzzy relations

Courses Offered by Department of Mathematics for Program Outcome of M.Sc. (Mathematics)

Program Outcomes, Program Specific Outcomes, Course Outcomes

Course Outcomes	**Stochastic Processes (MATH -576)** **CO 01**: Have a reinforced knowledge of basic probability theory and effectively express themselves in statistical terms either in written or oral. **CO 02:** Understand and apply sequences of random variables **CO 03:** Have a firm understanding of the central limit theorem and its applications **CO 04:** Understand the basic concepts of continuous random processes **CO 05:** Apply the knowledge of Poisson Process and Marcov chains in practicalsituations **CO 06:** Apply the concept of Random walk-in real-world problems
Credits	LTP:3/1/0
Course Outcomes	**Applied Functional Analysis (MATH - 577)** **CO 01:** Student will understand about basic properties of Hilbert space and itsapplications. **CO 02:** They will analyze Minkowski functional, Separation Theorem and Kuhn-Tucker Theorems. **CO 03:** Student will be able to understand Spectral theory of operators and compactoperations. **CO 04:** Student will understand L2 spaces over Hilbert spaces and its properties.
Course Outcomes	**Fluid Mechanics (MATH- 578)** **CO 01:** Students will understand the basic concept of fluid mechanics. **CO 02:** They apply Euler's equation of motion, Bernoulli's equation in realsituations. **CO 03:** They get idea about velocity potential and stream functions.

	CO 04: They understand about Milne Thomson Circle Theorem, and Blasius Theorem.
Credits	LTP:3/1/0
Course Outcomes	**Integral equation and transformation (MATH-554)** **CO 01:** Student will learn the classification of linear integral equation. **CO 02:** Student will be able to compute resolvent kernel. **CO 03:** Student will be able to solve the integral equation through different techniques.

Department of Microbiology, Akal College of Basic Sciences

M.Sc. Microbiology

(Two Year Degree Programme)

Program Objectives	1. Demonstrate an ability to understand the potential of basic and applied microbiology in addressing the problems of society and public health. 2. Attain eligibility, skills and competency to pursue career in higher educational institutions, R&D laboratories, medical research, biological research, scientific writing, industries, diagnostic labs, quality control labs and food production houses. 3. Identify entrepreneurship potential of interdisciplinary microbiological & biotechnological education and their implementation to create job potential for others. 4. Inculcate continuous learning, work culture and professional ethics to adapt in a team and as a team leader in challenging and responsible position of education and research.
Program Outcomes	On completion of M.Sc. Microbiology programme, students will be able to apply the knowledge of microbiology and interdisciplinary allied sciences to understand the microbial life processes & interactions *in vitro* and *in vivo* and their impact on environment & human life. Learners will be able to identify the research problems, search research literature, use appropriate research methodology, statistical analysis and data interpretation to apply reasoning obtained through the contextual knowledge to assess impact of microorganisms on the society, environment and public health. Learners will be able to apply ethical principles and professional ethics at position of responsibilities and to work effectively as an individual, and as a team member or team leader in multidisciplinary academic and research settings.
Program Specific Outcomes	1. At the end of M.Sc. Microbiology programme, learners will be able to understand the applications and importance of Environmental Microbiology, Industrial Microbiology, Food Microbiology, Medical Microbiology, Immunology, Agricultural Microbiology, Microbial Biotechnology and Biochemistry. 2. Learners will be able to design and perform experiments and execute a short research project incorporating techniques of basic and advanced microbiology. 3. Learners will demonstrate competent skills in handling various instruments, following standard microbial practices and safety guidelines at work places. 4. Learners will develop independent thinking and competence to carry out microbiological testing, quality control, microbial production, biopharmaceutical production, epidemiological work, diagnostic assays, research work, phylogenetic analysis, academic jobs and administrative responsibilities at various levels.

Course Specific Outcomes On completion of a specific course, the learners will be able to:	
General Microbiology	Understand the contributions of eminent scientists in the field of microbiology, various groups of microbial cells viz. bacteria, archaea, algae, fungi, protozoa, protists, viruses, prions; prokaryotic vs eukaryotic cells and microbial classification.

Microbial Metabolism	Understand the mechanism, process and types of metabolic pathways occurring in microbial cells related to ATP generation, respiration, fermentation, photosynthesis, anabolism, catabolism, enzyme kinetics, bioenergetics and DNA metabolism.
Immunology	Understand the structure, function and roles/applications of immune system, antigens, antibodies, APCs, humoral & cellular immunity, tissue transplantation, complement system, hypersensitivities, immunodeficiencies and autoimmune disorders.
Environmental Microbiology	Learn the concepts of biodegradation, bioremediation, wastewater treatment, solid waste treatment, bio-composting, biomining, biogeochemical cycles and symbiosis.
Food & Dairy Microbiology	Acquire knowledge of types of foods, importance of microbes in food production, dairy fermented foods, food spoilages, Pasteurization, preservation methods, food infections, food intoxication, MAP, HACCP, food certification, water quality analysis, coliforms, aseptic packaging and public health.
Industrial Microbiology & Fermentation Technology	Understand the scope of industrial microbiology, strain improvement, IPRs, design & types of bioreactors/fermenters, commercial production of alcoholic beverages, dairy products, bakery products, vitamins, colours, flavouring agents, antibiotics, steroids, microbial enzymes, bioethanol, biofuels, bioplastics, microbial construction materials, polysaccharides and upstream & downstream processing.
Medical & Diagnostic Microbiology	Understand about normal microbiota, pathogenic microbes, infectious diseases, pandemic, epidemic, pathogenesis, laboratory diagnosis, blood culture systems, antibiotics, antimicrobials, MIC testing, biopharmaceuticals, disease transmission, public health, ESKAPE, NTDs and drug resistance.
Molecular Biology	Understand about DNA, RNA, proteins, replication, transcription, translation, PTMs, cloning vectors, gene libraries, recombinant DNA, gene regulation, PCR, blotting techniques, DNA fingerprinting, genetic engineering, GMOs and recombinant products.
Biostatistics	Learn the basic knowledge of probability, distributions, means, standard deviation, correlation, skewness, kurtosis, testing of goodness of fit by applying chi square and t- test, ANOVA and statistical software packages.
Computation Biology & Bioinformatics	Understand computer hardware & software, networking protocols, multimedia applications, information technology, bioinformatics tools, biological databases, softwares for sequence alignment, phylogenetic analysis and data interpretation.
Research Methodology	Acquire knowledge research problem, objectives of research, experimental design, data collection, data analysis & interpretation, hypothesis testing procedures, ethics in research, plagiarism, scientific writing, thesis submission and scientific publishing, peer-review process.
Dissertation	Acquire ability to identify the research topic, design objectives, utilize journals & e-resources for literature survey, technical skills in carrying out experiments, operation of sophisticated analytical instruments, data collection, analysis & interpretation, competent scientific writing, effective communication & presentation skills and thesis writing & submission.

M.Sc. (Physics) Program

Program Outcomes, Program Specific Outcomes, Course Outcome

Program Outcomes	**M.Sc. (Physics) Program**
PO1.	Scientific knowledge: Apply the knowledge of physics fundamentals with the help of mathematics to the solution of physical problems.
PO2.	Problem analysis: Identify, formulate, research literature, and analyze physical problems using basic principles of Physics.
PO3.	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO4.	Individual and team work: function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO5.	Communication: Communicate effectively on complex activities with the scientific community and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO6.	Modern tool usage: Apply appropriate techniques, resources, and modern scientific & engineering techniques to complex physical activities with an understanding of the limitations.
PO7.	Research Proficiency: Apply various modern techniques for research specific activities/experiments and analysis purpose
PO8.	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.
Program Specific Outcomes	**PSOs of M.Sc. (Physics) Program**
PO1.	Understand the advanced concepts of Mathematical Physics, Classical Mechanics, Statistical Mechanics, Quantum Mechanics, Electronics, Nuclear & Particle Physics, Atomic and Molecular Physics, Quantum Field Theory, Classical Electrodynamics, Condensed Matter Physics, General Theory of Relativity, Material Science, Renewable Energy Sources, Nano Physics
PO2.	Perform procedures/experiments as per laboratory standards
PO3.	Understand the complex applications of physics in real world problems

Course Outcomes	COs of the course "**PHY-511- Mathematical Physics-I**" describe general understanding of various mathematical tools used for solving various Physical problems. CO1: Describe the vector algebra &vector calculus and solve related problems. CO2: Explain delta, beta and gamma functions and solve related problems. CO3: Describe Fourier series and its properties and solve related problems. CO4: Explain matrices and solve related problems. CO5: Describes tensors and solve related problems.
Credits	03 Theory periods of one hour per week over a semester

Course Outcomes	COs of the course **"PHY-512- Classical Mechanics"** describe general understanding of Lagrangian and Hamiltonian Formulation, Canonical Transformations, Rigid Body Motion. CO1: Describe the Mechanics of a system of particles, constraints of motion, generalized coordinates. CO3: Describe Hamilton's principle, Legendre Transformation CO2: Explain D'Alemberts Principle, applications of Lagrangian formulation. CO4: Describe Canonical Transformation and Hamilton–Jacobi Theory CO5: Describe Rigid Body motion such as orthogonal transformations, Euler's theorem CO6: Describe inertia tensor, Small Oscillations
Credits	03 Theory periods of one hour per week over a semester

Course Outcomes	COs of the course **"PHY-513- Condensed Matter Physics–I"** describe general understanding of lattice dynamics, thermal properties, energy band theory, transport theory and liquid crystals. CO1: Develop an understanding of structure, elastic properties and lattice dynamics in solids. CO2: Explain thermal properties, lattice vibrations, normal modes. CO3: Enumerate and explain Electrons in a periodic potential, Bloch theorem, Semiconductor Crystals, superlattices. CO4: Define the transport theory, Boltzmann transport equation, Hall effect, Magnetoresistance.
Credits	03 Theory periods of one hour per week over a semester

M.Sc. (Physics) Program

Program Outcomes, Program Specific Outcomes, Course Outcome

Course Outcomes	COs of the course **"PHY-514- Quantum Mechanics–I"** describe general understanding of Basic Quantum Mechanics and related physical problems. CO1: Develop an understanding of the mathematical tools and basic concepts of quantum mechanics. CO2: Develop an understanding of angular momentum and related problems. CO3: Understand stationary state approximation methods and their applications. CO4: Understand time dependent perturbation theory and its applications. CO5: Understand time independent perturbation theory and its applications.
Credits	03 Theory periods of one hour per week over a semester

Course Outcomes	COs of the course **"PHY-515-Electronics–I"** describe general understanding of Circuit Analysis, Semiconductor Devices and applications, Communication systems and related problems. CO1: Develop an understanding of circuit analysis such as The venin and Norton theorems, Mesh and Node analysis. CO2: Enumerate and explain the Classification of Feedback amplifiers, Direct and indirect semiconductors, diodes, Solar cell, UJT, Gunn diode, IMPATT devices, Liquid crystal displays, FET. CO3: Enumerate and explain the Differential amplifiers, Analogue computation, oscillator, filters CO4: Clearly define the communication systems in broad aspects such as review of analog modulation techniques, analog pulse modulation techniques, Pulse code modulation, satellite communication and cellular mobile communication.
Credits	03 Theory periods of one hour per week over a semester

Course Outcomes	COs of the course **"PHY-516- Physics Laboratory–I"** ddescribe general understanding physics practical and related problems. CO1: Understanding and determine the coefficient of self-inductance of a coil by Anderson bridge. CO2: Study of Cathode Ray Oscilloscope and its various applications. CO3: Study of characteristics of semi-conductor devices (UJT, FET). CO4: Study of tunnel diode and Zener diode characteristics. CO5: Designing and study of Op-Amp: Characteristics and parameter measurements. CO6: Study of multi vibrators (a) a stable (b) bi-stable (c) mono-stable. CO7: To study Op-Amp as an active filter, its frequency response and basic mathematical operations. CO8: Determination of thickness of mica sheet using Michelson Interferometer. CO9: To determine the velocity of ultrasonic waves in a given liquid.
Credits	03 Theory periods of one hour per week over a semester

Course Outcomes	COs of the course **"PHY-517- Computational Physics Laboratory–I"** describe general understanding of MATLAB and its application in mathematical and physical problems. CO1: Develop an understanding of basic commands used for programming in MATLAB. CO2: Develop an understanding of programming in MATLAB for various mathematical problems. CO3: Develop an understanding of programming in MATLAB for various physics problems. CO4: Enumerate and explain programming in MATLAB for various material science problems.
Credits	03 Theory periods of one hour per week over a semester

Course Outcomes	COs of the course "PHY-521-Mathematical Physics-II" describe general understanding of Group Theory, Tensors, Fourier Series and Integral Transforms, integral Equations and related physical problems. CO1: Develop an understanding of Elements of Probability such as Definition and Theorem of total probability, Poisson Law, Binomial, Normal and Poisson distributions CO2: Enumerate and explain Differential Equations such as Linear Equations with variable Coefficients, Equations of the second order and solutions CO3: Enumerate and explain the Basic properties of Bessel, Legendre, Hermite and Laguerre functions. CO4: Clearly define the Cauchy Riemann conditions Taylor & Laurent series; Numerical Techniques, Differentiation, integration by trapezoid and Simpson's rule.
Credits	03 Theory periods of one hour per week over a semester

Course Outcomes	COs of the course "PHY-522- Condensed Matter Physics-II" describe general understanding of optical properties and related theories, magnetism, principal of magnetic resonance, superconductivity and disordered materials and related problems. CO1: Develop an understanding of magnetism in materials, Pauli paramagnetism, Weiss theory, Heisenberg Hamiltonian, and Bloch T3/2 law. CO2: Enumerate and explain Polarization mechanisms, Clausius-Mosotti relation; sources of polarizability, frequency dependence of polarizability. CO3: Explain and understand Experimental Survey, thermodynamics of superconducting transitions, BCS theory of superconductivity, High Tc superconductors CO4: Explain and understand the basic concepts of defects and dislocations; noncrystalline solids such as glasses, Quasi-crystals, amorphous semiconductors and ferromagnets.
Credits	03 Theory periods of one hour per week over a semester

Course Outcomes	COs of the course "PHY-523- Quantum Mechanics -II" describe general understanding of Scattering, Dirac relativistic Hamiltonian, Quantization of wave fields, Quantum Field Theory and related problems CO1: Develop an understanding of Scattering cross-section and scattering amplitude, Born approximation, Yukawa potential and square well potential, CO2: Enumerate and explain Schrodinger equation, Klein- Gordon Equation, Hydrogen-like atom. CO3: Enumerate and explain Dirac relativistic Hamiltonian, elementary idea of hyperfine structure of hydrogen atom and Lamb shift. CO4: Clearly define the Elementary idea of quantization of fields, second quantization, quantum electrodynamics, Feynman diagrams and their applications.
Credits	03 Theory periods of one hour per week over a semester

Course Outcomes	COs of the course "PHY-524-Statistical Mechanics" describe general understanding of Statistical Basis of Thermodynamics, Ensembles and related physical problems. CO1: Develop an understanding of thermodynamic potentials, chemical potential, black body radiation and Plank's distribution law, Gibbs paradox, Liouville's theorem. CO2: Enumerate and explain Maxwell relations, grand-canonical ensembles, a system of quantum harmonic oscillators as canonical ensemble. CO3: Enumerate and explain Bose-Einstein condensation, Pauli paramagnetism etc. CO4: Define the Phase First- and second-order phase transitions, Thermodynamic fluctuations etc
Credits	03 Theory periods of one hour per week over a semester

Course Outcomes	COs of the course "PHY-525-Electronics-II" describe general understanding of Digital circuits, A/D Converters, Digital logic families, Microprocessor, Semiconductor Memories. CO1: Explain the Boolean algebra, Code convertors. CO2: Describe about the Sequential circuits, A/D Converters. CO3: Able to explain the Digital logic families such as RTL, DTL, ECL, etc. CO4: Explain the concept of Microprocessor & Micro controller.
Credits	03 Theory periods of one hour per week over a semester

Course Outcomes	COs of the course **"PHY-526–Physics Laboratory–II"** describe ggeneral understanding of Physics lab experiments and physical problems. CO1: Demonstrate the temperature-dependence of conductivity of a given semiconductor crystal using four probe method. CO2: Determine the band gap of a semiconductor by Four Probe Method. CO3: Demonstrate the temperature dependence of a ceramic capacitor: Verification of Curie-Weiss law for the electrical susceptibility of a ferroelectric material. CO4: Able to determine the Hall voltage, Hall coefficient and the carrier concentration of a given semi-conductor. CO5: Explain the modulation & demodulation of AM and FM wave.
Credits	03 Practical periods of two hour per week over a semester

Course Outcomes	COs of the course **"PHY-527–Computational Physics Laboratory–II"** describe general understanding of MATLAB and its application in mathematical and physical problems. CO1: Develop an understanding of programming in MATLAB for various mathematical physics problems. CO2: Develop an understanding of programming in MATLAB for various quantum physics problems. CO3: Develop an understanding of programming in MATLAB for various nuclear physics problems. CO4: Develop an understanding of programming in MATLAB for various material science problems.
Credits	02Practical periods of two hour per week over a semester

Course Outcomes	COs of the course "PHY-528-Project Seminar" describe students' ability to effectively present, defend, and receive constructive feedback on their project proposals, enhancing their communication and critical thinking skills crucial for successful project implementation. CO1: Craft clear and concise project proposals. CO2: Practice presenting proposals to peers and instructors. CO3: Constructive criticism reception and incorporation will be emphasized. CO4: Refine communication and presentation skills. CO5: Foster critical thinking in defending project ideas. CO6: Better prepared for successful project implementation.
Credits	01Theory periods of one hour per week over a semester

Course Outcomes	COs of the course "PHY-591-Synopsis Seminar" describe students' ability to succinctly and persuasively present the key components and objectives of their research synopses, demonstrating their mastery of the research topic, methodology, and significance, while also receiving constructive feedback to refine and strengthen their research proposals. CO1: Present concise research synopses including research-gap. CO2: Demonstrate significance of research topics and methodologies. CO3: Constructive feedback will refine and strengthen proposals. CO4: Refine communication and presentation skills. CO5: Foster critical thinking in defending research ideas. CO6: Better prepared to precede with their research projects.
Credits	01Theory periods of one hour per week over a semester

Course Outcomes	COs of the course "PHY-531-Nuclear and Particle Physics" describe general understanding of Nuclear Masses and Nucleon-Nucleon Interaction, Nuclear Structure, Nuclear Models, nuclear reactions, Classification of fundamental forces CO1: Develop an understanding of nuclear masses, nuclear mass formula, stability of nuclei, beta decay and double beta decay, deuteron problem, nuclear potential. CO2: Enumerate and explain Rotational spectra. Elementary ideas of alpha, beta and gamma decays and their selection rules. CO3: Classification of Elementary particles and their quantum numbers, Gellmann-Nishijima formula. Quark model, Standard Model of Particle Physics. CO4: Clearly define the Standard Model of Particle Physics: SU(3) x SU(2) x U(1) gauge theory
Credits	03 Theory periods of one hour per week over a semester

Course Outcomes	COs of the course "PHY-532-Atomic and Molecular Physics" describe general understanding of many electron atoms and molecular quantum mechanics, various atomic and molecular spectroscopy, interactions of atoms with radiation CO1: Enumerate and explain Molecular Quantum Mechanics: Electron spin. Hydrogen molecular ion, hydrogen molecule, Relativistic corrections Hyperfine structure and isotope shift, width of spectrum lines, LS and JJ couplings. CO2: Develop an understanding Zeeman, Pashchen-Bach-Oppenheimer approximation. Electronic, rotational, vibrational and Raman spectra of diatomic molecules, selection rules. CO3: Develop an understanding offine and hyperfine structure of atoms, electronic, vibrational and rotational spectra for diatomic molecules, role of symmetry, selection rules, term schemes, and applications to electronic and vibrational problems. CO4: Explain and understand the basic concepts of atoms in an electromagnetic field, induced absorption and emission, spontaneous emission and line-width, Einstein A and B coefficients, density matrix formalism, two-level atoms in a radiation field, Lasers.
Credits	03 Theory periods of one hour per week over a semester

Course Outcomes	COs of the course "PHY-533-Materials Science" describe general understanding of various type of materials, structural properties of materials, materials preparation and characterization techniques and related topics. CO1: Develop an understanding of material noncrystalline and semi crystalline states, crystal systems, indices of lattice directions and planes, symmetry classes and point groups, space groups, phase transition in materials etc. CO2: Enumerate and explain Classification of Materials: Alloys and composites and optoelectronic materials, Polymer, Liquid crystals and quasi crystals, Ceramics. CO3: Develop an understanding of preparation of materials by different techniques (e.g. zone refining, epitaxial growth. Melt-spinning and quenching methods, Materials Preparation Techniques. CO4: Develop an understanding of various Materials Characterization Techniques (e.g. X-ray Diffraction (XRD), XPS, STM, AFM, TEM, SEM, IR, Ultraviolet (UV) and visible spectroscopy)
Credits	03 Theory periods of one hour per week over a semester

Course Outcomes	COs of the course "PHY-534-Classical Electrodynamics" describe general understanding of Electrostatics, Magnetostatics, Boundary value problems, Electromagnetic Waves and related problems CO1: Develop an understanding of Laplace and Poisson's equations, Electrostatic potential, vector potential CO2: Define Maxwell's equations in vacuum, Coulomb and Lorenz gauges. CO3: Enumerate and explain Dirichlet and Neumann Boundary conditions, Boundary value problems, Magnetostatic boundary value problems. CO4: Define the wave equation, plane waves in free space and isotropic dielectrics, Lienard-Wiechert potentials.
Credits	03 Theory periods of one hour per week over a semester

M.Sc. (Physics) Program

Program Outcomes, Program Specific Outcomes, Course Outcome

Course Outcomes	COs of the course "PHY-535-Field Visit and Exploratory Physics" include that students will be proficient in applying theoretical physics concepts to diverse real-world scenarios, fostering interdisciplinary understanding, analytical skills, effective communication, and critical thinking abilities. CO1: Explore traditional/conventional technologies for new innovative ideas. CO2: Understand the working and future possibilities of solar photovoltaic technologies and solar thermal technologies. CO3: Understand about the discoveries led by Noble Prize winners in Physics. CO4: Able to make models related to Physics and collect Physics related news in newspapers or Internet. CO5: Explore Physics job opportunities through printed and electronic media. CO6: Understand about the patents granted in the field of Physics and associated applied sciences. CO7: Able to solve the various questions asked in CSIR-NET/GATE/SET Examinations.
Credits	02 Theory periods of one hour per week over a semester

Course Outcomes	COs of the course "PHY-536-Physics Laboratory - III" describe general understanding Physics lab experiment and related problems. CO1: Able to determine temperature-dependence of conductivity of a given semiconductor crystal using four probe method. CO2: Calculate the band gap of a semiconductor by Four Probe Method. CO3: Able to verify Curie-Weiss law for the electrical susceptibility of a ferroelectric material. CO4: Determine the Hall voltage, Hall coefficient and the carrier concentration of a given semi-conductor. CO5: Determine the dielectric constant of a liquid by dipole meter. CO6: Understand the modulation & demodulation of AM wave. CO7: Understand the modulation& demodulation of FM wave.
Credits	03 Theory periods of one hour per week over a semester

Course Outcomes	COs of the course "RM-599- Research Methodology" describe general understanding of some basic concepts of research and its methodologies. CO1: Develop an understanding of need, importance and impact of research, types of research, research process. CO2: Learn about synopsis writing, Selecting research problem; formulation of research projects; survey of literature. CO3: Develop an understanding of formulation and types of hypothesis; collection, maintenance, storage and analysis of data. CO4: Understand compilation and presentation of results, writing of manuscripts; research reports and thesis. CO5: Know about various funding agencies provides financial support for research and writing research proposal for external funding. CO6: Develop an understanding of computer and informatics including word processing, excel, power point presentation etc. CO7: Explain and understand principal and working procedure of various lab instruments.
Credits	03Theory periods and 01 Tutorial of one hour per week over a semester

Course Outcomes	COs of the course "PHY-600- Thesis" describe that student will able to produce an original and rigorous scholarly work demonstrating commend on research methodologies, critical analysis, and synthesis of findings in their chosen field of study. CO1: Conduct in-depth research on a specific topic, applying advanced analytical and critical thinking skills. CO2: Develop ability to formulate clear research questions and hypotheses, guiding their investigation. CO3: Contribute new insights or perspectives to their field of study. CO4: Develop proficiency in writing and communication of research findings. CO5: Develop readiness for independent research and investigation.
Credits	20 periods of one hour per week over a semester

Course Outcomes	COs of the course "PHY-541-Science of Renewable Energy Sources" describe general understanding of energy sources, solar energy, hydrogen energy, wind energy, wave energy and oceanic thermal energy conversion and related topics. CO1: Explain and enumerate production alternatives and reserves of energy sources in the world and in India. CO2: Understand the need of renewable energy sources, energy security and energy conservation. CO3: Able to describe energy and its environmental impacts and distributed generation. CO4: Develop an understanding of solar thermal and solar photovoltaic technologies and their applications. CO5: Explain and understand the hydrogen production techniques, importance of hydrogen energy as per environmental concern, storage techniques and safty issues. CO6: Gain an understanding of wind energy, wave energy and OTEC and their implementation criteria.
Credits	03 Theory periods of one hour per week over a semester

Course Outcomes	COs of the course "PHY-542-Optoelectronics" describe general understanding of Injection luminescence, the basic principles of laser actions, optical detectors, junction detectors and related problems. CO1: Develop an understanding of recombination processes, the spectrum of recombination radiations, direct and indirect band gap semiconductors, internal and external quantum efficiency. CO2: Enumerate and explain spontaneous and stimulated emission and absorption, the condition & theory for the laser action, condition for gain, semiconductor Injection Laser. CO3: Explain and understand optical detection, quantum efficiency, responsivity, photoconductive detectors, CO4: Explain characteristics of particular photoconductive materials, solar cell, holography, LCD, optical fibers, free space optics and applications CO4: Develop an understanding of detectors performance parameters, materials and design for p-i-n photodiodes. Avalanche photodiodes detectors (APD), Avalanche photodiodes design, phototransistors.
Credits	03 Theory periods of one hour per week over a semester

Course Outcomes	COs of the course "PHY-543-Particle Accelerator Physics" describe general understanding of charged particle dynamics, radiofrequency accelerators, electrostatic and heavy ion accelerators, synchrotron radiation sources, radioactive ion beams and related problems. CO1: Develop an understanding of Particle motion in electric and magnetic fields, Beam transport system etc. CO2: Enumerate and Radiofrequency Accelerators. CO3: Explain and understand on-Electrostatic and Heavy Ion Accelerators: Van de Graaff voltage generator, Cockcroft Walton voltage generator. CO4: Develop an understanding of time series, lyapunov exponents. Invariant measure, kolmogorov -Sinai entropy. Fractal dimension, Statistical mechanics and thermodynamic formalism. CO5: Explain and understand Synchrotron Radiation Sources: Electromagnetic radiation from relativistic electron beams, Electron synchrotron, dipole magnet.
Credits	03 Theory periods of one hour per week over a semester

Course Outcomes	COs of the course "PHY-544-Nano Physics" describe general understanding regarding types of Nanomaterials and their Properties. CO1: Develop an understanding of nanomaterials and their properties: clusters, metal nanocluster, magic number, theoretical modelling of nanoparticles etc.. CO2: Enumerate and explain Types of Magnetic Materials, Effect of Bulk nanostructuring of Magnetic properties etc. CO3: Explain and understand quantum wells, wires, and dots, Preparation of quantum nanostructures. CO4: Develop an understanding the synthesis of Nanomaterials (Bottom up Approach): Synthesis of Nanomaterials (Top down Approach): Ball milling, and Some special Nanomaterials.
Credits	03 Theory periods of one hour per week over a semester

Course Outcomes	COs of the course "PHY-545-Advanced Computational Physics" describe general understanding of various advances developed in Computational Physics. CO1: Develop an understanding of concepts of deterministic and stochastic simulation methods, limitations of simulational physics. CO2: Enumerate and explain Monte Carlo Method, Random walk on one, two and three dimensional lattices, self-avoiding walk, micro-canonical ensemble, canonical ensemble, classical ideal gas, ising model, grand canonical ensemble. CO3: Explain and understand Molecular Dynamics. CO4: Develop an understanding of symbolic computing systems. CO5: Explain and understand computing hardware basics: memory and CPU, components.
Credits	03 Theory periods of one hour per week over a semester

Course Outcomes	COs of the course "PHY-546-Nuclear Technology" describe general understanding of interaction of radiation with matter :Detectors and Instrumentation :Industrial and Analytical Applications :Nuclear Energy Power from Fission: CO1: Develop an understanding of interaction of radiation with matter. CO2: Enumerate and explain Detectors and Instrumentation. CO3: Explain and understand Industrial and Analytical Applications. CO4: Develop an understanding of Nuclear Energy Power from Fission.
Credits	03 Theory periods of one hour per week over a semester

Course Outcomes	COs of the course "PHY-547-Medical Physics" describe general understanding of the observational basis of e interaction of radiation with matter, Biological Effects of radiation, Nuclear Medicine. CO1: Develop an understanding of Introduction, Heavy charged particle interactions, electron interactions. Gamma rays interactions: - photoelectric effect. CO2: Enumerate and explain Initial interactions, Dose, dose rate and dose distribution, Damage to critical tissue, Human exposure to radiation and Risk assessment. CO3: Explain and understand the Positron Emission Tomography (PET), Magnetic resonance Imaging (MRI), Radiation Therapy. Mossbauer Spectroscopy. CO4: Develop an understanding of Nuclear Energy Power from Fission.
Credits	03 Theory periods of one hour per week over a semester

Course Outcomes	COs of the course "PHY-548-Fibre optics and Non-linear Optics" describe general understanding of Optical fibre and its properties, Fiber fabrication and cable design, optics of anisotropic media, Electro-optic and acousto-otpic effects and modulation of light beams, and Non-linear optics/processes. CO1: Develop an understanding of Optical fibre and its properties. CO2: Enumerate and explain Fiber fabrication and cable design. CO3: Explain and understand optics of anisotropic media. CO4: Develop an understanding of Electro-optic and acousto-otpic effects and modulation of light beams, and Non-linear optics/processes. CO5: Explain and understand Non-linear optics/processes.
Credits	03 Theory periods of one hour per week over a semester

Course Outcomes	COs of the course "PHY-549-Astrophysics" describe basic concepts of celestial sphere, interstellar medium and molecular clouds, stellar evolution and nucleo-synthesis, cosmology and related topics. CO1: Develop an understanding of right ascension, ecliptic, basic stellar properties; luminosity, estimation of distance using parallax method and cepheid variables, origin of emission and absorption spectra, Doppler effect and its applications etc. CO2: Explain the structure of our galaxy, globular clusters, velocity distribution of stars, fine structure of carbon, origin of spiral arms and its basic features, Interstellar dust and theory of extinction of stellar light etc. CO3: Explain and understand pre-main sequence collapse, origin of the solar system, Jean's criteria, late stage evolution of stars, red giant phase, white dwarf, supernova, neutron star, black hole, stellar nucleo-synthesis etc. CO4: Develop an understanding of simple extragalactic observations, Olber's paradox, Hubble's constant and its implications, the steady state universe, Evolution of the Big Bang, time evolution of the future universe etc.
Credits	03 Theory periods of one hour per week over a semester

Course Outcomes	COs of the course "PHY-550-Project" describe general understanding practical exposure to the students about ongoing research in basic and applied areas of Physics and different research techniques and methods. It will impart skills on planning, performing, analyzing and, data interpretation of experiments. Students will also acquire proficiency in reading research articles, preparing PowerPoint presentations and giving oral presentations. CO1: Design and execute a comprehensive project plan, demonstrating effective project management skills and adherence to timelines. CO2: Apply theoretical knowledge to solve practical problems, fostering critical thinking and problem-solving abilities. CO3: Communicate project findings and outcomes clearly and persuasively through written reports and oral presentations. CO4: Cultivate collaboration and teamwork skills as students engage in group work, fostering a supportive and inclusive learning environment.
Credits	03 Practical periods of two hour per week over a semester

M.Sc. (Physics) Program

Program Outcomes, Program Specific Outcomes, Course Outcome

Course Outcomes	COs of the course "PHY-551- Special Seminar" demonstrate advanced understanding and critical analysis of specialized topics within the field, enhancing their ability to engage in scholarly discourse and research. CO1: Analyze and evaluate advanced topics within the field, fostering deeper understanding and intellectual engagement. CO2: Demonstrate effective communication skills in clear complex concepts to peers and instructors. CO3: Broaden scholarly viewpoint and encourage interdisciplinary connections. CO4: Cultivate independent research skills, explore specialized topics and develop insights through guided study.
Credits	01Theory periods of one hour per week over a semester

Programme: M.Sc. (Zoology) (Two-year degree programme)

PROGRAMME OUTCOMES (POs)

PO 1: Gain a thorough grounding in the fundamentals in different areas of Zoology such as ecology, biodiversity, entomology, developmental biology, applied zoology etc.

PO 2: Develop the skill of applying concepts and techniques used in animal sciences.

PO 3: Apply ethical principles in animal behaviour, wild life conservation etc.

PO 4: Effectively aware the society about human wildlife conflict.

PO 5: Develop an attitude to perform effectively and efficiently as a leader as well as a member of a team in a sustainable development.

PO 6: Ability to engage in lifelong learning.

PO 7: To integrate knowledge, skill and attitude that will sustain an environment of learning and creativity among the students.

PO 8: Exposure about museums, zoos, national parks, sanctuaries, apairy, diary, vermicomposts units and laboratories.

PO 9: Enabling students to be capable of making decisions at personal and professional level.

PO 10: Getting prepared for post graduate studies and other competitive exams in order to achieve success in their professional careers.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO 1: Students will be able to develop, demonstrate and disseminate the knowledge and skills to laymen about climate change, pollution, communicable diseases and biodiversity.

PSO 2: Students also acquire skills to work as animal trainers, animals care takers, conservationists, lab technicians, zookeeper, wildlife biologists and many more.

PSO 3: Students will be able to play roles of animal breeder, forensic experts, lab technicians etc. which will help learners to possess knowledge and other soft skills and to react aptly when confronted with critical or unethical decision making.

PSO 4: Students will learn modern techniques such as composite culture such as pisciculture, aquaculture, sericulture, lac culture, oyster culture etc. applying these skills in their future careers in Zoology and other applied fields.

PSO 5: Students will be able to develop and demonstrate knowledge of applied zoology in integrated farming system for sustainable development.

PSO 6: Students will gain thorough systematic and subject skills within various disciplines of entomology, parasitology, embryology, physiology, ecology and applied zoology (apairy, diary, vermiculture etc.).

PSO 7: Learners will be able to recognize the role of zoologist, animals and wild life educators, veterinarian, entomologist, parasitologist etc. which will help learners to possess knowledge and other soft skills.

PSO 8: Learners will acquire the skills like effective communication, decision - making, problem solving in day to day life affairs.

PSO 9: Learners will involve in various co-curricular activities to demonstrate relevancy of foundational and theoretical knowledge of their academic major and to gain practical exposures therein.

PSO 10: Apart from theoretical knowledge learners can also acquire practical skills to work as zoo keeper, wildlife educators, animal trainers, veterinarian and various sectors such as healthcare centres, Pharmaceutical companies, pathology labs, medical camps academic institutions etc.

Course	Course outcomes (COs)
	M. Sc. Zoology (1st Sem.)
Biosystematics (ZOO-511)	**CO 1:** Students will learn basics of taxonomy its types, stages of taxonomy and importance of taxonomy in biology. Rules for the classification of organisms, identification criteria and taxonomic characters. **CO 2:** Students will be able to explain various types of species concepts such as typological, biological evolutionary and other kinds of species. **CO 3:** Students will understand morphological, embryological, ecological, behavioural, cytological and biochemical approaches used in taxonomy. **CO 4:** Students will understand various techniques used in taxonomy such as electrophoresis, infrared spectrophotometry, histochemical analysis and DNA hybridization etc.

Structure & Functional Organization of Animal -I (ZOO-512)	**CO 1:** Students will understand basics of nutrition & digestion and mechanism of digestion and regulation of secretion in non-chordates and chordates. **CO 2:** Learners will get knowledge on circulatory system in chordates and non-chordates, types of hearts such chambered, tubular and ampullary hearts, neurogenic and myogenic hearts. **CO 3:** It will equip the students about respiratory system: Types of respiration and types of respiratory organs in aquatic and terrestrial animals. Distribution, role and brief chemistry of respiratory pigments in non-chordates and chordates. **CO 4:** It will brief the students about excretion and osmoregulation. excretory products and excretory structures in non-chordates and chordates.
Evolutionary Biology (ZOO-514)	**CO 1:** Students should know about the evolution of complex organic molecule from complex inorganic compounds and formation of protobionts (first primitive cell). **CO 2:** Equip the students about patterns of similarities and differences among living beings over time and across habitats through action of biological processes such as natural selection, mutation and genetic drift. **CO 3:** Students should learn about phylogeny and evolutionary history of horse and man. **CO 4:** Students should know about geological time scales, eras, epochs and evolution of various animal groups in these ages.
Comparative Vertebrate Endocrinology and Reproduction (ZOO-515)	**CO 1:** Learners will get knowledge on neuro-endocrine glands, structure, secretion, functions and their regulation. **CO 2:** Students will understand mechanisms of hormone action. **CO 3:** Understanding of reproductive patterns and larval forms and their evolution in vertebrates **CO 4:** Students will get knowledge on gametogenesis; Gamete maturation, fertilization, implantation, parturition, lactation and their regulations.

General Microbiology **(MICRO-511)**	**CO 1:** Students will get knowledge on general history of microbiology, Scope and importance of microbiology. Bacterial cell structure, shapes, cell membrane, cell wall, flagella, capsule, pili, endospores and magnetosomes etc. **CO 2:** Learners will get knowledge on morphology, habitat, life cycle, nutrition and classification of archaea, fungi (yeats and molds), algae, protozoa and viruses. **CO 3:** It will brief the students about reproduction and growth of microorganisms, growth measurement paremeters, Effect of pH, temperature and oxygen on growth of bacteria. **CO 4:** Students will understand about antibiotics: types, properties, mode of action, drug resistance and mechanism of antibiotic resistance in microbes.
General Biochemistry (BIOCHEM-511)	**CO 1:** Learners will get knowledge on classification, structure and functions of carbohydrates, lipids and nucleic acids **CO 2:** Learners will get knowledge on enzymes: structure, classification, mechanism of action, regulation and factors affecting enzyme action. **CO 3:** It will brief the students about photosynthesis and respiration. General metabolism of carbohydrates, proteins and lipids. **CO 4:** Understanding of genetic material its structure, replication, transcription, translation and recombinant DNA technology.
M. Sc. Zoology (2nd Sem.)	
Structure & Functional Organization of Animal -II (ZOO-521)	**CO 1:** Students will get knowledge on integumentary system: General features of the Integument, specializations of integument and its evolution in various animal groups. **CO 2:** To understand muscular system: Classification of muscles, structure and chemical and molecular events occurring during muscle contraction. **CO 3:** To understand skeletal system: Exo and endo skeletons in vertebrates and invertebrates.

	CO 4: Understanding of sensory system: General sensory organs, free sensory receptors, encapsulated sensory receptors, associated sensory receptors and mechanisms of perceiving stimuli.
Embryology (ZOO-522)	**CO 1:** To learn about sex determination and mechanism of sex determination. differentiation of gonad and the genital tract. Spermatogenesis: structural and molecular events occurring during spermatogenesis. **CO 2:** To know about Sertoli and Leydig cells their structure and functions: Leydig and Sertoli cell proliferation during foetal and postnatal development. **CO 3:** Learners will understand about male sterility and related conditions such as azoospermia, oligozoospermia, asthenozoospermia, varicocele and genetic basis for male infertility. **CO 4:** To know about reproductive cycles in females such as menstrual cycle in human and estrous cycle in rat.
Endocrinology (ZOO-523)	**CO 1:** Students will get knowledge on the basic concepts of endocrinology: introduction to the endocrine system, classes of hormones, modes of hormone secretion and comparative aspects of endocrine physiology in vertebrates. **CO 2:** To know about evolution of pituitary gland and physiological actions of pituitary hormones. Evolution of renin-angiotensin system. **CO 3:** To know about evolution of thyroid gland. Thyroid hormone synthesis and its regulation. **CO 4:** To know about pancreatic hormones and its role in glucose homeostasis.
Limnology (ZOO-524)	**CO 1:** To get basics of Limnology – Definition, historical development and scope of Limnology. Types of freshwater habitats such as ponds, streams and rivers. **CO 2:** Students will get knowledge to analyse methods of water quality testing such as BOD, DO and COD etc. **CO 3:** Students will become aware about resource conservation and other related issues such as aquatic pollution, regulation on discharge of industrial effluents and domestic wastes in rivers and reservoirs.

	CO 4: Students will be able to understand about use and misuse of inland waters.
Insect and Environment (ZOO-525)	**CO 1:** Students will get knowledge about apiculture, sericulture and Lac culture **CO 2:** Students will understand the importance of insects as biological control agents, insects as pollution indicator, insects as food, Insects as scavengers and Insects as pollinators. **CO 3:** Students will know about the role of insects in pharmacy and in forensic investigations. **CO 4:** Students will get knowledge about various types of adaptations (Morphological, Ecological, Physiological) found in insects at high altitudes.
Plant and Animal Biotechnology (BT-507)	**CO 1:** To equip the students about plant and animal biotechnology: historical perspectives, laboratory organization and tissue culture media. **CO 2:** Students will get knowledge about molecular markers, construction of maps, molecular breeding and DNA fingerprinting. Also successful examples drought resistant plants such as transgenic papaya, Bt cotton, flavr savr tomato and golden rice. **CO 3:** Students will get knowledge on animal cell culture. Different types of culture media and application of animal cell culture along with cryopreservation of cell lines, also in-vitro fertilization, embryo transfer technology and animal cloning. **CO 4:** Understanding of stem cells applications in medicine and tissue engineering technologies.
Molecular Biology and Genetic Engineering **(MICRO-524)**	**CO 1:** Understanding of genetic material: Structure of DNA, replication, DNA damage and repair; Types of RNA and their role in gene expression. **CO 2:** Understanding of translation; components involved, t-RNA as adapter, genetic code and its salient features. **CO 3:** To get knowledge on cloning strategies: cloning of genomic DNA, cDNA cloning, selection and characterization of clones.

	CO 4: To learn about PCR: principle, types and role in molecular biology.
	M. Sc. Zoology (3rd Sem.)
Cytogenetics **(ZOO-531)**	**CO 1:** To understand Mendelian principles of heredity. **CO 2:** To understand chromosomal aberrations **CO 3:** Polyploidy and its significance. **CO 4:** Students will get knowledge about mutations such as spontaneous and induced, physical and chemical mutagens.
Research Methodology **(ZOO-599)**	**CO 1:** To equip the students about history, myths and ethnic practices and research process. **CO 2:** To know about how to write synopsis of research projects etc. **CO 3:** To know the importance of computer and informatics in research. **CO 4:** Students should be aware about the current status and future prospects of research
Tools and Techniques in Biology **(ZOO-532)**	**CO 1:** Students will be get knowledge about microscopy, its principle & applications along with the other techniques used in biochemistry and microbiology. **CO 2:** Students will get knowledge about chromatography, electrophoresis their principles, type and applications. Radioisotopes and main isotope techniques in biology. **CO 3:** Students will learn about histological techniques: Principles of tissue fixation, microtomy, staining, mounting and other parameters used in histochemistry. **CO 4:** Students will study various cell culture techniques: Culture media, essential components and preparation, cell viability and testing etc.
Computational Biology & Biostatistics **(BT-505)**	**CO 1:** Students will understand basics of biostatistics, concept of variables in biological systems, collection, classification, tabulation, graphical and diagrammatic representation of numerical data.

	CO 2: Students will learn about correlation and regression coefficients; curve fitting by least squares methods. **CO 3:** Understanding of DNA microarrays, databases and data management cluster analysis. **CO 4:** To equip the students with gene finding algorithms and Hidden Markov Models (HMM) softwares.
Parasitology **(ZOO-534)**	**CO 1:** Indepth understanding of protozology: Brief history of protozology, ecology and host parasite relationship along with zoonotic potentiality of protozoa. **CO 2:** Students will learn about morphology, life cycle, pathology, symptomatology, laboratory diagnosis and treatment of some pathogenic and non-pathogenic protozoans. **CO 3:** Students will learn about morphology, life cycle, pathology, symptomatology, laboratory diagnosis and treatment of some pathogenic helminths. **CO 4:** Students will learn about arthropod vectors of human diseases. Classification and general characteristics of important insect vectors and mode of transmission of various diseases.
Entomology **(ZOO-535)**	**CO 1:** Students will understand the history of entomology in India. Factors for insect abundance and classification of phylum arthropoda upto orders. **CO 2:** Students will get knowledge about insect morphology: Body segmentation, structure of Head, thorax and abdomen. Structure and modifications of insect antennae, mouth parts and legs. Wing venation, modifications and wing coupling apparatus. Structure of male and female genetalia. **CO 3:** Students will learn about sensory system and sensory organs found in insects. **CO 4:** Students will be able to understand metamorphosis and diapause in insects.

Department of Botany

Akal College of Basic Sciences

Learning Outcomes
Ph.D. Botany

ETERNAL UNIVERSITY
Baru-Sahib, Sirmaur (H.P.)

Eternal University, Baru Sahib (HP)
Master of Science (M Sc Botany)

Semester	Course code	Course name	L	T	P	D
I	BOT-601	Research Methodology	3	0	0	0
	BOT-602	Instrumental Methods of Analysis	3	0	0	0
	BOT-691	Seminar	0	1	0	0
	BOT-701	Dissertation	0	0	0	5
		Sub Total	**6**	**1**	**0**	**5**

(Optional Course-I)

Semester	Course code	Course name	L	T	P	D
I	BOT-603	Recent advances in botany	3	0	0	0
	BOT-604	Taxonomy of Angiosperms & Gymnosperms	3	0	0	0
	BOT-605	Phycology	3	0	0	0
	BOT-606	Biochemistry & Molecular Biology of Plants	3	0	0	0
	BOT-607	Bryophytes & Pteridophytes	3	0	0	0
		Sub Total	**3**			

Optional Course-II)

Semester	Course code	Course name	L	T	P	D
I	BOT-608	Plant resources & Utilization	3	0	0	0
	BOT-609	Plant Physiology	3	0	0	0
	BOT-610	Cytogenetics & Plant Breeding	3	0	0	0
	BOT-611	Plant Pathology	3	0	0	0
	BOT-612	Mycology	3	0	0	0
		Sub Total	**3**			

Semester	Course code	Course name	L	T	P	D
II	BOT-692	Synopsis Seminar	0	1	0	0
III	BOT-701	Dissertation	0	0	0	15
IV	BOT-701	Dissertation	0	0	0	15
V	BOT-701	Dissertation	0	0	0	15
VI	BOT-701	Dissertation	0	0	0	15
		Sub Total	**0**	**1**	**0**	**75**

Doctor of Philosophy

PROGRAMME OUTCOMES (POs)

PO1: Qualified doctors in the philosophical background in the biology of plants.

PO2: Qualified professional Botanists: Plant Taxonomists, Phyto-Physiologists, Phyto-Geneticist, Ecologist, and many more in the field of teaching and scientific research.

PO3: Help in meeting the manpower requirements of institutions of lower as well as higher learning and research centres by providing qualified professional plant biologists.

PO4: Influential contributions to scientific discovery and engage in formal and informal teaching and mentoring, and progress to careers in academia, industry, government and non-governmental organizations.

PO5: Practically skilled and theoretical sound, educated botanists in the mission of Nation - building process with knowledge of plant molecules to the organism level - by covering a wide range of scientific disciplines concerned with the study of plants.

PROGRAMME SPECIFIC OUTCOMES (PSOs): PhD – Botany

PSO1: Scientific knowledge and understanding of: Wide range of scientific disciplines concerned with the study of plants, which includes Bryology, Pteridology, Gymnosperms, Plant Resource Utilization, Angiosperms: Phylogeny & Embryology, Phycology, Cell &Molecular Biology, Plant Anatomy, Taxonomy of Angiosperms, Cytogenetics & Plant Breeding, Environmental Botany, Mycology, Biochemistry and Molecular Biology of Plants, Plant & Animal Biotechnology, Forestry, Comprehensive Test & Field Botany, Plant Pathology, Plant Physiology, Research Methodology, Computational Biology & Biostatics, Genetic Engineering.

PSO2: Practical skills: To write and conduct independent research under mentorship; To identify the diverse group of plants and their pathogens from the environment; To perform and present self before the challenging teaching and research problems; To carry out practical work, in the field and in the laboratory, with precaution and minimal risk; To conduct vegetation and biochemical analyses of plants; Knowledge of appropriate statistical methods and computer basics.

PSO3: Intellectual skills: To generate logical thinking to solve the problem in effective and practical manner; To assimilate knowledge and ideas to plan and conduct an independent project; To construct and test the hypothesis to execute the real problems of plant sciences.

PSO4: Use of modern scientific instruments & tools: Understanding of principle, procedure, methodology, application of instrumentation, their precaution and limitations. Use of modern instruments and equipment for Biochemical analysis & estimation, Molecular Biology, Biotechnology, Plant Tissue culture experiments, cellular and physiological activities of plants.

PSO5: Moral principles & ethics: To be morally responsible and ethical-conduct towards sustainability of biodiversity, environment and conservation.

COURSE OUTCOMES (COs)

Subject: Research Methodology **Subject Code: BOT – 601**

CO1: Understanding the concept of research, research applications in functional areas of business and emerging trends in Botany research.
CO2: Elaborate the scientific method of research, formulation of research projects, steps in research process and preparation of synopsis.
CO3: Understanding the qualities of a good hypothesis and concept of hypothesis testing and test of significance.
CO4: Understanding MS word, MS excel, and MS PowerPoint, graph and figure plotting.
CO5: Elaborate the concept & need of sampling and types of sampling.
CO6: Understating scaling techniques and types of data.
CO7: Understanding the data analysis, graphical representation of data and writing of manuscripts.

Subject: Instrumental Methods of Analysis **Subject Code: BOT – 602**

CO1. Principle, working and applications of Microscopy and spectroscopy.
CO2. To understand the advancement in Radio-isotopy.
CO3. Elaborate the concept of Chromatography techniques.
CO4. To understand the process and function of different electrophoresis techniques.
CO5. To acquaint with principle, working and applications of dialysis, microfiltration, centrifugation and hydro-dynamic methods.
CO6. To learn methods of DNA and peptide sequences.

Subject: Seminar **Subject Code: BOT – 691**

CO1: To acquaint the students with natural flora and fauna in various regions through field trips.
CO2: To organizing botanical excursions and visits to various herbaria and botanical gardens of the country.
CO3: Analyze effective application of management principles to diagnose and solve organizational problems and develop optimal managerial decisions.
CO4: Demonstrate the applicability of field report on the basis of their excursion tours.
CO5: Understanding the concept of field botany and their application in comprehensive test based on it.

Subject: Dissertation **Subject Code: BOT – 701**

CO1: To acquaint the students with dissertation work.
CO2: Demonstrate the research topic assigned.
CO3: Understand the concepts of given research topic and analyze and solve the problem.
CO4: To submit thesis for evaluation of students and they required to collect, analyze the data and submit their dissertation.

Subject: Recent Advances in Botany **Subject Code: BOT – 603**

CO1. To know the diversified habitats of cryptogams,
CO2. To understand the recent advancement in biodiversity assessment and conservation.
CO3. Elaborate the concept of recent advancement in plant physiology.
CO4. To understand the process and function of cellular totipotency, somatic embryogenesis and use of tissue culture in agroforestry.
CO5. To acquaint with recent advancement in cytogenetics, molecular biology, plant breeding and transgenics.
CO6. To learn about the scope and importance of Biotechnology.

Subject: Taxonomy of Angiosperms & Gymnosperms **Subject Code: BOT – 604**

CO1: To acquaint the students with significance, aims and procedures of plant taxonomy; Alpha- and Omega- taxonomy; Biosystematics.
CO2: Demonstrate the herbaria practices, and Botanical gardens.
CO3: Understand the concepts of diagnostic keys, ranks of taxa and nomenclature of taxa according to their ranks.
CO4: Understanding the plant nomenclature and the International Code of Botanical Nomenclature (ICBN).
CO5: Understanding the concept of numerical taxonomy.
CO6: Understanding the Botanical Survey of India, its organization and role.

Subject: Phycology **Subject Code: BOT – 605**

CO1: Understand the concepts and salient features of different taxonomic categories of algae.
CO2: Demonstrate the structure and function of thallus organization in algae.
CO3: Understand the current concepts and relationships of prochlorophycean algae.
CO4: Demonstrate the rhythms and bioluminescence in dinoflagellates.
CO5: Understanding the economic importance of algae.

Subject: Biochemistry & Molecular Biology of Plants **Subject Code: BOT–606**

CO1: To acquaint the students with structure and function of cell organelle.
CO2: Demonstrate the synthesis and transport of sucrose.
CO3: Understand the concepts of biochemistry of seed germination and development, biochemistry of fruit ripening, phytohormons and their mode of action, signal transduction.
CO4: Understanding the concept of nitrogen fixation and nitrate assimilation, sulphate reduction and incorporation of sulphur into amino acids.
CO5: Understanding the concept of biochemistry and significance of secondary metabolites.
CO6: Understanding the concept of molecular biology of various stresses.

Subject: Bryophytes & Pteridophytes **Subject Code: BOT – 607**

CO1: Understand the concepts and salient features of different taxonomic categories of bryophyta.
CO2: Demonstrate the structure and function of Antheridia and Archegonia in major taxonomic groups of bryophytes.

CO3: Understand the concepts related to evolution of sporophyte in bryophytes, conduction and water relations.
CO4: Demonstrate the epiphytes, epiphylls; epiliths litter species fire mosses, coprophilous species, calcicoles and calcifuges, halophytes, epizoic bryophytes.
CO5: Understanding the concept of dispersal of bryophyte diaspores, major patterns of bryophyte distribution.
CO6: Understand the concepts and salient features of different taxonomic categories of Pteridophyta.
CO7: Demonstrate the structure and function of comparative morphology of the sporophyte, stelar system, sporangial characteristics.
CO8: Understand the spore structure, types and patterns of spore germination in ferns.
CO9: Demonstrate the natural and induced apogamy and apospory in pteridophytes.
CO10: Understanding the utility concept of ferns for phytoremediation, ferns as hyper accumulators of arsenic, mechanism of uptake, transfer and tolerance.

Subject: Plant Resource and Utilization **Subject Code: BOT – 608**

CO1: Demonstrate the center of origin and uses of minor cereals, oil crops and legumes.
CO2: Understand the concepts related to psychoactive drugs and narcotics: source, botany, active principle and commercial significance.
CO3: Demonstrate the concepts related to medicinal plants and their classification with reference to obtained drugs.
CO4: Demonstrate the concepts related to aromatic plants and their classification with reference to obtained drugs.
CO5: Understanding the concept of uses of plant-based insecticides.

Subject: Plant Physiology **Subject Code: BOT – 609**

CO1: To acquaint the students with recent concepts of structure and composition of membrane with various classes of pumps and their significance.
CO2: Demonstrate the plant respiration.
CO3: Understand the concepts of photosynthesis.
CO4: Understanding the concept related to nitrogen fixation by free and symbiotic organisms.
CO5: Understanding the concept of plant hormones.
CO6: Understanding the concept related to reproductive physiology, phytochrome/hormones in reproduction, stress physiology, secondary metabolites.

Subject: Cytogenetics & Plant Breeding **Subject Code: BOT – 610**

CO1: To acquaint the students with genomes organization in prokaryotes and eukaryotes.
CO2: Demonstrate the organization of plastid and mitochondrial genomes.
CO3: Understand the concepts of chromosome structure and DNA packaging, euchromatin and heterochromatin, karyotype analysis and banding patterns.
CO4: Understanding the enzymes involved in replication, polymerase, topoisomerase, methylase, nucleases and restriction endonucleases.
CO5: Understanding the concept of genetic recombination, and sex determination.
CO6: Understanding the concept of principles of plant breeding.

Subject: Plant Pathology **Subject Code: BOT – 611**

CO1: To acquaint the students with history of plant pathology and pathogenesis.

CO2: Demonstrate the enzymes and toxins in plant diseases.
CO3: Understand the concepts of host parasite interaction, alteration in plant physiological functions and defense mechanisms in plants.
CO4: Understanding the concept of resistance and susceptibility, vertical and horizontal resistance, mutation, heterokaryosis, transformation, transduction and physiological specialization.
CO5: Understanding the concept of plant pathogens dispersal and diseases forecasting.
CO6: Understanding the concept related to cultural and chemical control, breeding for disease resistance.

Subject: Mycology **Subject Code: BOT – 612**

CO1: To acquaint the students with introduction to fungi and their significance to humans.
CO2: Demonstrate the characteristics of fungi and fungal systematic.
CO3: Understand the general account, structure and reproduction of Chytridiomycota, Myxomycota, Oomycota, Zygomycota, Ascomycota, Basidiomycota and mitotic fungi.
CO4: Understanding the concept related to rust and smut fungi.
CO5: Understanding the detailed account of the different orders with specific reference to *Saprolegnia, Achlya, Legninidium, Pythium, Phytophthora* and *Albugo*.

Subject: Synopsis Seminar **Subject Code: BOT – 692**

CO1: To acquaint the students with natural flora and fauna in various regions through field trips.
CO2: To organizing botanical excursions and visits to various herbaria and botanical gardens of the country.
CO3: Analyze effective application of management principles to diagnose and solve organizational problems and develop optimal managerial decisions.
CO4: Demonstrate the applicability of field report on the basis of their excursion tours.
CO5: Understanding the concept of field botany and their application in comprehensive test based on it.

Program: Ph.D. (Chemistry)

PROGRAM OUTCOMES (POs)

PO 1: Constructing a concrete foundation for theoretical, quantitative, and logical thinking that underlies theories and models related to the chemical sciences

PO 2: Integrate concepts and ideas learned in theory with skills learned in laboratories to formulate hypotheses, collect & compile data to deduce results and draw logical conclusions.

PO 3: To develop skills to use of both classical and modern tools for investigation of chemical systems.

PO 4: Exploring new areas of research in interdisciplinary and multidisciplinary areas.

PO 5: Design proper procedures and rules for safety and handling of chemicals.

PO 6: Create awareness of the benefits and impacts of chemistry on environment, society and other disciplines outside the scientific community.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: Learners will get advanced understanding in the area of characterization techniques in chemistry.

PSO2: Students will understand chemical and molecular processes in chemical reactions.

PSO3: Students will gain knowledge of design and perform experiments efficiently and effectively, and analyze the data to draw conclusions.

PSO4: Developing a mechanistic understanding of selectivity and synthetic strategy and research skills applicable to modern chemistry.

PSO5: Learners can also acquire practical skills to work as chemist, faculty and other industrial supporting services.

Ph.D. (Chemistry)	
Course	**Course Outcomes (COs)**
Nanomaterial and Applications (CHEM-601)	CO1: To know historical developments, synthesis, characterization and important applications of nanomaterials. CO2: Learn the physicochemical properties of nanomaterials and Preparation of nanostructured oxides. CO3: Understanding the influence of nanomaterials on health, communication, Energy, Environment, safety, security and defence. CO4: Enhance the sufficient scientific background to advanced inorganic materials and metal chalcogenides, and their characterization by modern techniques. CO5: To understand the importance of nanotechnology for sustainability, Nanomedicine, Environmental, health, and safety issues.
Advance Physical Chemistry (CHEM-602)	CO1: Learner will come to know the various techniques for preparation of Materials and applications in soid state devices. CO2: To know the kinetics of redox reactions, catalysis, their types and theories of catalysis. General mechanism, difference between phase transfer and mecellar catalysis. CO3: To understand the structure of liquids, relationship between structure and the thermodynamics properties, influence of solute on structure of water and structure of water near a surface. CO4: Enhance scientific background to dipolar interactions, dipolar molecules in gases and liquids, methods for determination of dipole moments.
Advance Organic Chemistry (CHEM-603)	CO1: Enhance the sufficient scientific background to Neighbouring Group Mechanism, Neighbouring Group (NG) participation by π and σ bonds. CO2: To understand isotope effect, its origin and importance in determining reaction mechanism. CO3: Enhancing the knowledge in stereochemistry, methods of determination of Chemical transformation, Asymmetric Synthesis and Quaciracemates.

	CO4: To understand some naming rearrangements in organic reactions.
Structure from Spectra (CHEM-604)	CO1: To learn basic principle of Ultra-violet spectroscopy and its application to study absorption maximum for dienes, polyenes, carbonyl compounds and α,β-unsaturated carbonyl compounds using Woodward rule. CO2: To understand importance infrared spectroscopy, Fingerprint region and interpretation of IR spectra in synthetic or natural products chemistry. CO3: To learn interpretation of spectra, chemical shift, shielding mechanism and anisotropic effects, chemical exchange and chemical exchange and chemical shifts in chiral molecules in NMR Spectroscopy and CMR Spectroscopy. CO4: To know principle, working , interpretation of spectra by using Mass Spectrometry
Advance Inorganic Chemistry (CHEM-605)	CO1: Learner will come to know about principle, working and types of electrodes used in polarography - Electro analytical Techniques. CO2: To understand Principles, theory and applications of Amperometry, Coulometry and AC Polarography. CO3 To know about Phosphorescent Materials, light emitting diodes, types and principle of organic light emitting diodes. CO4: To understand general characteristics of different types of main group organometallics, their stability and routes of M-C bond formation.
Disconnection Approach and Heterocyclic Chemistry (CHEM-606)	CO1: To know the application of stereochemistry in organic synthesis. CO2: To understand the use and application of disconnection approach for organic synthesis. CO3: Learner will know the basic principles of green chemistry and application of non-conventional techniques in organic synthesis CO4: To learn general synthesis of compounds with three or more heteroatoms in the ring
Research Methodology (CHEM-609)	CO1: The students would learn about various research methods used in research. CO2: To know how to do survey of literature in specific field and how to write synopsis for research proposal.

	CO3: To understand research as career; current status and future prospects of a specific research field. CO4: To learn experimental designs, sampling designs, recording of observation, measurement and scaling techniques.
Seminar (CHEM-607)	CO1: Learning how to pick a problem for their research project and to provide latest facts and updated information by consulting latest editions of textbooks, reference books, monographs and peer-reviewed national & international research journals.
Dissertation (CHEM-701)	CO1: Students will learn how to work on a research topic assigned to him/her by their supervisor/mentor with a purpose to develop a collective approach to study, analyze and solve the problem.

Programme Ph.D. Mathematics

PROGRAM OUTCOMES (POS)

PO 01: Students archive knowledge of different branches of Mathematics.

PO 02: Develop the skill of formulating real word problem into mathematical models.

PO 03: Handling different industrial problem and their solutions.

PO 04: Applying different Numerical techniques in solution of linear and non-linear real-world problem.

PO 05: Applying different software in research work.

PO06: Enhance the Logical approach in different fields.

PO 07: Enhance ethical knowledge.

PO 08: Handling different type problems with patience.

PO 09: Programming capacity of the students increases.

PO10: learners apply his/her knowledge for betterment of the society.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO 01: After completion of this program mentally thinking power will by high.

PSO 02: Reasoning and analytical approach increases.

PSO 03: Students get good job in research and industry after completion this program.

PSO 04: After completion this program mentally thinking power will by high

PSO 05: learners become good manager since they understand different optimization techniques.

PSO 06 It refines the mental ability of the students.

PSO 07 Learners knowledge uplift the society.

Ph.D. Mathematics

Course outcome

Course	Course Outcome (COs)
	Ph.D. Mathematics
Research Methodology (MATH-609)	CO 01: Student will be able to learn how to write synopsis. CO 02: Student will be able to understand about basic terms of statistics. CO 03 : Student will be able to learn application of computer fundamentals in research . CO 04: Student will be understood about plagiarism and IPR.
Stochastic Processes and its application (MATH-622)	CO 01: Student will be understood about probability theory. CO 02: Student will be understood about different type distributions. CO 03: Student will be able to solve gambler's ruin. CO 04: Student will be understand Chapman Kolmogorov equations.
Fuzzy Set Theory (MATH-623)	CO 01: Student will be able to differentiate between fuzzy set and crisp set. CO 02: Student will be understand about Fuzzy union algebraic sum and bounded sum in Fuzzy set theory. CO 03: Student will be able to understand Fuzzy Equations, Fuzzy number, Convex Fuzzy set. CO 04: Student will be understand about Fuzzy morphism.
Operation Research: Theory and its Applications (MATH-624)	CO 01: Student will be able to understand hyper surface and convex theory. CO 02: Student will be able to solve LPP. CO 03: Student will be able to solve transportation problem. CO 04: Student will be able to solve Two person zero sum game.
Optimization Techniques (MATH-625)	CO 01: Student will be able to understand the convex hull. CO 02: Student will be able to solve LPP. CO 03: Student will be able to solve Lagrangian dual problem.

	CO 04: Student will be able to understand first and second order optimality conditions.
Genetic Algorithms , Artificial Neural Networks and Applications (MATH-626)	CO 01: Student will be able to understand applications of the genetic algorithm. CO 02: Student will be able to solve TSP. CO 03: Student will be able to understand solve artificial neural networks CO 04: Student will be able to understand image processing and computer vision.
Application of Finite Element Method in Mathematical Modeling (MATH-627)	CO 01: Student will be able to understand different type polynomial approximations. CO 02: Student will be able to understand Mathematical Modeling. CO 03: Student will be able to solve Eigen value Problems. CO 04: Student will be able to understand heat and wave equations.
Digital Image Processing (MATH-628)	CO 01: Student will be able to understand about fundamentals of image processing. CO 02: Student will be able to understand about image restoration. CO 03: Student will be able to understand about image compression. CO 04: Student will be able to understand the Fourier transformation.
Digital Image Processing (MATH-628)	CO 01: Student will be able to understand about fundamentals of image processing. CO 02: Student will be able to understand about image restoration. CO 03: Student will be able to understand about image compression. CO 04: Student will be able to understand the Fourier transformation.
Graph Theory and its applications (MATH-629)	CO 01: Student will be able to understand about fundamentals of graph. CO 02: Student will be able to understand about automorphism and Cayley graph. CO 03: Student will be able to understand about minimum and maximum imbedding. CO 04: Student will be able to understand graphical measurement.
Foundations of Fourier and Wavelet	CO 01: Student will be able to understand metric space and Normed linear space CO 02: Student will be able to understand about Fourier series

Analysis (MATH-630)	. CO 03: Student will be able to understand about Fourier transform. CO 04: Student will be able to understand about wavelet transform.
Advanced Time Frequency-Wavelet Transform Methods and their Applications Analysis (MATH-631)	CO 01: Student will be able to understand Fourier analysis. CO 02: Student will be able to understand about time frequency methods. CO 03: Student will be able to understand about orthogonal wavelet packets CO 04: Student will be able to understand about estimation in wavelet.
Advanced Fluid Mechanics (MATH-632)	CO 01: Student will be able to understand behaviour of fluids . CO 02: Student will be able to understand velocity and acceleration of fluids. CO 03: Student will be able to understand about steady flow. CO 04: Student will be able to understand behaviour of waves in liquid.
Dynamical System (MATH-633)	CO 01: Student will be learn about linear and nonlinear dynamical system. CO 02: Student will be learn about circuit theory. CO 03: Student will be able to understand about bifurcation theory. CO 04: Student will be able to understand about stability analysis.
Topology and Differential Geometry (MATH-634)	CO 01: Student will be learn about topological space. CO 02: Student will be able to understand about manifolds. CO 03: Student will be able to understand about different type bundles. CO 04: Student will be able to understand about lie algebra.
Commutative Algebra (MATH-635)	CO 01: Student will be learn about rings and modules. CO 02: Student will be learn about ideal domain. CO 03: Student will be able to understand Dedekind domain. CO 04:Student will be able to understand about fractional ideals.
Applied Functional Analysis (MATH-636)	CO 01: Student will be learn about Normed linear and Banach spaces. CO 02: Student will be learn about dual space. CO 03: Student will be able to understand about spectral theory.

	CO 04: Student will be able to understand about compact operators.
Analysis (MATH-637)	CO 01: Student will be learn about linear transformation. CO 02: Student will be learn about measure theory. CO 03: Student will be learn about lebesgue integran and its convergence. CO 04: Student will be learn about convex function
Numerical Techniques and its Application in Differential equation (MATH-638)	CO 01: Student will be able to solve linear algebraic equations. CO 02: Student will be able to solve BVP. CO 03: Student will be able to understand least square method. CO 04: Student will be learn about different numerical Methods.

Department of Microbiology, Akal College of Basic Sciences

Ph.D. Microbiology

(Research Programme)

Program Outcomes	On completion of M.Sc. Microbiology programme, students will be able to apply the knowledge of microbiology and interdisciplinary allied sciences to understand the microbial life processes & interactions *in vitro* and *in vivo* and their impact on environment & human life. Learners will be able to identify the research problems, search research literature, use appropriate research methodology, statistical analysis and data interpretation to apply reasoning obtained through the contextual knowledge to assess impact of microorganisms on the society, environment and public health. Learners will be able to apply ethical principles and professional ethics at position of responsibilities and to work effectively as an individual, and as a team member or team leader in multidisciplinary academic and research settings.
Program Specific Outcomes	Research students will be able to understand the applications and importance of basic and applied microbiology disciplines. They will be able to independently design and execute experimental work towards completion of specific research problem for doctoral degree. Learners will demonstrate competent skills in handling various instruments, following standard microbial practices and safety guidelines at work places. Competence, learning and independent thinking will allow learners to carry out microbiological testing, quality control, microbial production, biopharmaceutical production, epidemiological work, diagnostic assays, phylogenetic analysis, research work and administrative work in their further academic profession and industrial job assignments.

Course Specific Outcomes On completion of a specific course, the learners will be able to:	
Research Methodology	Acquire knowledge research problem, objectives of research, experimental design, data collection, data analysis & interpretation, hypothesis testing procedures, ethics in research, plagiarism, scientific writing, thesis submission and scientific publishing, peer-review process.
Thesis work	Acquire ability to identify the research topic, design objectives, utilize journals & e-resources for literature survey, technical skills in carrying out experiments, operation of sophisticated analytical instruments, data collection, analysis & interpretation, competent scientific writing, effective communication & presentation skills and thesis writing & submission.

Ph.D. (Physics) Program

Program Outcomes, Program Specific Outcomes, Course Outcomes

Program Outcomes	**Ph.D. (Physics) Program**
PO1.	Scientific knowledge: Apply the knowledge of physics fundamentals to the solution of specific research problems.
PO2.	Problem analysis: Identify, formulate, research literature, and analyze research related problems using basic principles of physics.
PO3.	Conduct investigations of research problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO4.	Modern tool usage: Apply appropriate techniques, resources, and modern scientific & engineering techniques to complex research related physical activities with an understanding of the limitations.
PO5.	Research Proficiency: Apply various modern techniques for research specific activities/experiments and analysis purpose
Program Specific Outcomes	**PSOs of Ph.D. (Physics) Program**
PO1.	Understand the concepts of research fundamentals and methodology
PO2.	Perform procedures/experiments as per standards
PO3.	Apply the scientist knowledge for the analysis and interpretation of the simulated/experimental outcomes
PO4	Skill of writing scientific reports and articles as per international standards

Course Outcomes	COs of the course "PHY-601-Advanced Nano Physics" Describe general understanding of nanoscience and nanotechnology, Fundamental behavior of 0-D, 1-D, 2-D, and 3-D materials, Quantum Wells, Wires, and Dots, Carbon Nano Structures and related topics. CO1: Develop an understanding of popular and scientific prospective of nanotechnology, classification of nanomaterials, density of states for 0-D, 1-D, 2-D, and 3-D materials, Quantum confinement, superlattices. CO2: Enumerate and explain structure determination by X-ray diffraction, reciprocal lattice, structure factor, size effect on X-ray diffraction, magnetoresistance etc. CO3: Explain and understand synthesis techniques for the preparation of nanoparticles; bottom up approach: sol-gel synthesis, hydrothermal growth, thin film growth (i.e. CVD, PVD). CO4: Develop an understanding sze effect on shape of materials, size effect on electronic properties- magic number, grain boundary effect, semiconductor nanoparticles; Plasmonic nanoparticles, CO5: Explain and understand some special nanomaterials: Carbon nano Structures: Fullerenes, C60, C80 SWNT and MWNT; nanocomposites: Metal-Metal nanocomposites, Polymer-Metal nanocomposites, ceramic nanocomposites.
Credits	03 Theory periods of one hour per week over a semester

Course Outcomes	COs of the course "PHY-602- Advanced Condensed Matter Physics" Describe general understanding of advancement of condensed matter physics and related problems. CO1: Linear and nonlinear dielectric properties of Materials: dielectric constants and Polarization mechanisms, linear dielectric materials etc. CO2: Enumerate and explain theory of magnetism: dia- and para-Ferro-, ferri- and anti-ferromagnetism magnetism in materials, Pauli paramagnetism, and Exchange interaction. Heisenberg Hamiltonian- mean field theory;. CO3: Explain and understand optical properties and optical transition; optical Processes and Excitons. CO4: Develop an understanding of many electron theory, Hartree-Fock theory, Second quantization formalism; Interactions of Electrons and Phonons with Photons CO5: Develop an understanding of Basic concepts in point defects, line defects, planner defects and dislocations in solids.
Credits	03 Theory and 01 Tutorial periods of one hour per week over a semester

Course Outcomes	COs of the course "PHY-603- Advanced Quantum Mechanics" describe general understanding of special theory of relativity, covariant formulation of electrodynamics, radiation from accelerated charges, general theory of relativity and related problems. CO1: Develop an understanding of solutions of Schrödinger Equation for 1-D and 3-D square wells and potential barriers, H-atom, harmonic oscillator in matrix mechanics etc. CO2: Enumerate and explain approximation methods: Non-degenerate and degenerate perturbation theory and application to anharmonic oscillator, variational method with application to ground state of harmonic oscillator and hydrogen atom. CO3: Explain and understand time dependent perturbation: General expression for the probability of transition from one state to another, Fermi's golden rule and its application to radiative transition in atoms. CO4: Develop an understanding of relativistic quantum mechanics: The Klein-Gordon equation. The Dirac equation. Dirac matrices, spinors. CO5: Explain and understand identical Particles: Symmetric and antisymmetric wave functions: Bosons and Fermions. Summarization postulates, CO6: Explain and understand Quantum Field Theory.
Credits	03 Theory and 01 Tutorial periods of one hour per week over a semester

Course Outcomes	COs of the course "PHY-608- Renewable Energy Sources and Technologies" Describe general understanding of energy sources, solar energy, hydrogen energy, wind energy, wave energy and oceanic thermal energy conversion and related topics. CO1: Explain and enumerate production alternatives and reserves of energy sources in the world and in India; need of renewable energy sources, energy security and energy conservation, energy and its environmental impacts, distributed generation. CO2: Develop an understanding of solar thermal and solar photovoltaic technologies and their applications. CO3: Explain and understand the hydrogen production techniques, importance of hydrogen energy as per environmental concern, storage techniques and safty issues. CO4: Develop an understanding of wind energy, wave energy and OTEC and their implementation criteria.
Credits	03 Theory and 01 Tutorial periods of one hour per week over a semester

Course Outcomes	COs of the course "PHY-604- Advanced Materials Science" Describe general understanding crystal structure of various materials, chemical bonding in solids, synthesis and characterization techniques of materials and related topics. CO1: Develop an understanding of crystalline and non-crystalline materials; classification of crystals; bravais lattices; symmetry in crystals, some special crystal structure. CO2: Enumerate and explain bonding in materials; phase transitions, magnetic, dielectric materials, high Tc superconductors, nanomaterials, alloys, semiconductors, polymers, ceramics, composites, solar energy materials, imperfection in a crystal. CO3: Explain and understand single crystal growth, chemical route synthesis, thin film preparation techniques; synthesis of nanomaterials: top down and bottom up approaches of synthesis of nano-structured materials, advanced materials in 3D printing. CO4: Develop an understanding of basic principal and application of XRD, Raman spectroscopy, XPS, STM, AFM, TEM, SEM. CO5: Develop an understanding of basic principal and application of IR, UV-Visible, Dielectric spectroscopy, VSM, SQUID.
Credits	03 Theory and 01 Tutorial periods of one hour per week over a semester

Course Outcomes	COs of the course "PHY-605- Advanced Computational Physics" describe general understanding of various advances developed in Computational Physics. CO1: Develop an understanding of concepts of deterministic and stochastic simulation methods, limitations of simulational physics. CO2: Enumerate and explain Monte Carlo Method, Random walk on one, two and three dimensional lattices, self-avoiding walk, micro-canonical ensemble, canonical ensemble, classical ideal gas, ising model, grand canonical ensemble. CO3: Explain and understand Molecular Dynamics. CO4: Develop an understanding of symbolic computing systems. CO5: Explain and understand computing hardware basics: memory and CPU, components.
Credits	03 Theory and 01 Tutorial periods of one hour per week over a semester

Course Outcomes	COs of the course "PHY-606- Advanced Optoelectronics" describe general understanding of basic principles of advance optoelectronics and related devices applications. CO1: Develop an understanding of electron-hole recombination process and band gap engineering in optical materials. CO2: Enumerate and explain principle of laser actions: spontaneous and stimulated emission and absorption, the condition for the laser action. CO3: Explain and understand working of semiconductor injection laser: efficiency, stripe geometry LED materials, commercial LED materials. CO4: Develop an understanding of basic electronic devices: p-n junction their application in solar cells and light emitting diodes, optical communications, fundamental principles of photonics and light-matter interactions. CO5: Explain and understand about waveguides switches and modulators and other devices of integrated optics.
Credits	03 Theory and 01 Tutorial periods of one hour per week over a semester

Course Outcomes	COs of the course "PHY-610- Advanced Materials and Energy Devices" Describe general understanding of advanced materials and their applications including energy devices. CO1: Develop an understanding of theories and physical mechanisms of advanced materials, concept of Fermi-energy, work function and electron affinity. CO2: Enumerate and explain interaction between materials of different chemical origin; organic and inorganic species; motifs and functions, bio-functional structure, carbon based materials CO3: Explain and understand concept of energy production and storage; Emerging trends in LEDs and optoelectronic devices; Electrochemical capacitors and supercapacitors. CO4: Develop an understanding of magneto-hydrodynamics and magnetic fluids; rechargeable batteries; solar batteries and solar charger; solar cells etc. CO5: Develop an understanding of hydrogen production techniques and storage using hybrid materials, hydride batteries and fuel cells.
Credits	03 Theory and 01 Tutorial periods of one hour per week over a semester

Course Outcomes	COs of the course "RM-599- Research Methodology" Describe general understanding of some basic concepts of research and its methodologies. CO1: Develop an understanding of need, importance and impact of research, types of research, research process. CO2: Learn about synopsis writing, selecting research problem; formulation of research projects; survey of literature. CO3: Develop an understanding of formulation and types of hypothesis; collection, maintenance, storage and analysis of data. CO4: Understand compilation and presentation of results, writing of manuscripts; research reports and thesis. CO5: Know about various funding agencies provides financial support for research and writing research proposal for external funding. CO6: Develop an understanding of computer and informatics including word processing, excel, power point presentation etc. CO7: Explain and understand principal and working procedure of various lab instruments.
Credits	03 Theory periods and 01 Tutorial of one hour per week over a semester

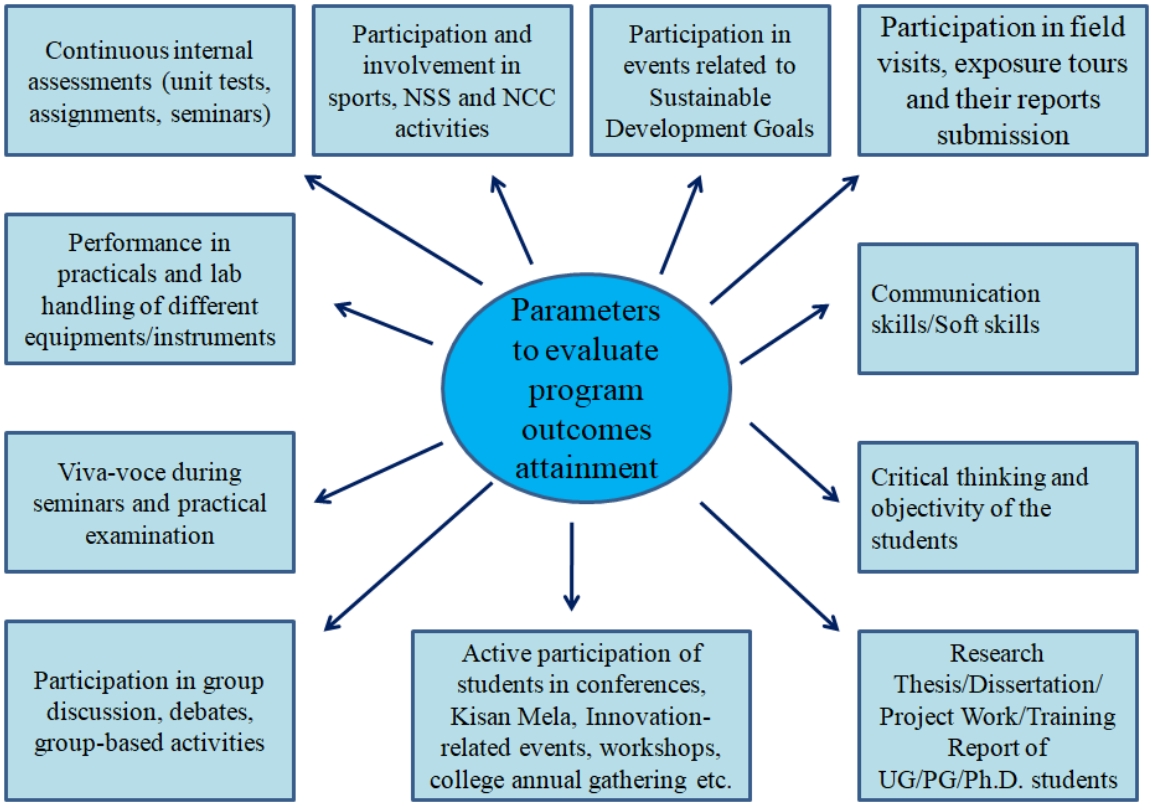
Course Outcomes	COs of the course "PHY-607- Seminar" describe the developing interest of the student in the selected research field along with related soft skills development. CO1: Develop interest towards research oriented field with ability to search the literature and brief report preparation. CO2: Develop the skills, competencies and points of view needed by professionals in the field most closely related to the course CO3: Discussion and critical thinking about topics of current intellectual importance CO4: Improve the communication skills and awareness about the research topic and its future scope. CO5: Development of presentation skills.
Credits	01 Tutorial periods of one hour per week by major advisor over a semester with presentation by the students at the end of the semester

Course Outcomes	COs of the course "PHY-701-Dissertation" focused to facilitate student to carry out extensive research or technical project at the place of work by identification of problem and research gap, development of methodology for solving the problem, interpretation of results, presentation of discussion of results in context of national and international research. The overall goal of the dissertation is for the student to gain the knowledge and skills required for independent work. CO1: Gain in-depth knowledge and use of adequate techniques in the major subject or research field of study. CO2: Create, analyze and critically evaluate different technical or research problems and their solutions. CO3: Present and discuss the conclusions as well as the knowledge and future prospects that form the basis for these findings. CO4: Identify the issues that must be addressed within the framework of the specific dissertation in order to take into consideration. CO5: Able to develop analytical skill. CO6: Cultivate the understanding of problem, study design, methodology/ experimentation, significance of reproducibility of results. CO7: Understanding of ethics of science and research for supporting higher studies. CO8: Learn effective project organizational skills along with discussions, result interpretation and writing review/research articles.
Credits	05 Practical periods of two hour per week in Ist semester. Including Semester-II onwards, the student will undertake his/her research work by taking 15 credit hours in each semester.

Attainment of Programme Outcomes, Programme Specific Outcomes and Course Outcomes

The performance of the students in their respective programmes is measured on the basis of various curricular (continuous assessment, assignments, mid-sessional examination and end-semester examination) and co-curricular activities. The methods and parameters on the basis of which the program outcomes attainment of different departments is ascertained on varied points are listed below:

1. **Continuous internal assessments (unit tests, assignments, seminars)**
2. **Performance in practicals and lab handling of different equipments/instruments**
3. **Viva-voce during seminars and practical examination**
4. **Participation in group discussion, debates, group-based activities.**
5. **Communication skills/Soft skills**
6. **Critical thinking and objectivity of the students**
7. **Research Thesis/Dissertation/Project Work/Training Report of UG/PG/Ph.D. students**
8. **Active participation of students in conferences, Kisan Mela, Innovation-related events, workshops, college annual gathering etc.**
9. **Participation and involvement in sports, NSS and NCC activities**
10. **Participation in events related to Sustainable Development Goals**
11. **Participation in field visits, exposure tours and their reports submission**



The attainment of Program Outcomes is assessed at different levels on the basis of performance in assessment and final year examinations:

Attainment Level 1 : **0-25%** Students successfully completed the respective program

Attainment Level 2 : **26-49%** Students successfully completed the respective program

Attainment Level 3 : **50-74%** Students successfully completed the respective program

Attainment Level 4 : **75-100%** Students successfully completed the respective program

Program Outcomes Attainment Level
(Year 2020-21)

Program Code	Program	Number of students appeared in the final year examination	Number of students passed in final year examination	Result %	Attainment level
BAHU	B.A. Humanities	43	42	97.67	**4**
BSPSY	B.Sc. (Hons.) Psychology	12	12	100	**4**
MSPSY	M.Sc. Psychology	6	6	100	**4**
MSCH	M.Sc. Chemistry	3	3	100	**4**
BSMA	B.Sc. (Hons.) Maths	4	4	100	**4**
BSMIC	B.Sc. (Hons.) Microbiology	3	3	100	**4**
BSM	B.Sc. Medical	5	5	100	**4**
BSNM	B.Sc Non-Medical	9	9	100	**4**
MSBOT	M.Sc. Botany	8	8	100	**4**
MSMA	M.Sc. Mathematics	5	5	100	**4**
MSMIC	M.Sc. Microbiology	1	1	100	**4**
MSZOO	M.Sc. Zoology	11	11	100	**4**
BSAG	B.Sc. (Hons.) Agriculture	69	69	100	**4**
BTFT	B.Tech. Food Technology	6	6	100	**4**
MSAGN	M.Sc. Agronomy	8	8	100	**4**
MSFT	M.Sc. Food Technology	2	2	100	**4**
MSGPB	M.Sc. Genetics and Plant Breeding	2	2	100	**4**
MSHOT	M.Sc.Horticulture	4	4	100	**4**
MSPP	M.Sc. Plant Pathology	2	2	100	**4**
BAMU	B.A. (Hons.) Music (GurmatSangeet)	11	10	90.90	**4**
BAMU	B.A. (Hons.) Music (Instrumental)	2	2	100	**4**
BAMU	B.A. (Hons.) Music (Tabla)	1	1	100	**4**
MAMU	M.A.Music (Instrumental)	2	2	100	**4**
BED	B.Ed.	15	15	100	**4**
BSEC	B.Sc. (Hons.) Economics	7	7	100	**4**
MSEC	M.Sc. Economics	3	3	100	**4**
BCOM	B.Com. (Hons.)	17	17	100	**4**
MBA	MBA (Finance)	4	4	100	**4**
MBA	MBA (HR)	1	1	100	**4**
BTCS	B.Tech. (CSE)	16	16	100	**4**
BTET	B.Tech. (ETE)	9	8	88.88	**4**
BSN	B.Sc. Nursing	61	61	100	**4**
MSN	M.Sc. Nursing	16	16	100	**4**

Program Outcomes Attainment Level
(Year 2021-22)

Program Code	Program	Number of students appeared in the final year examination	Number of students passed in final year examination	Result %	PO Attainment level
BAHU	B.A. Humanities	45	40	88.88	**4**
BSPSY	B.Sc. (Hons.) Psychology	10	10	100	**4**
MSPSY	M.Sc. Psychology	3	3	100	**4**
MSCH	M.Sc. Chemistry	1	1	100	**4**
BSMA	B.Sc. (Hons.) Mathematics	5	5	100	**4**
BSMIC	B.Sc. (Hons.) Microbiology	1	1	100	**4**
BSM	B.Sc. Medical	3	2	66.66	**3**
BSNM	B.Sc. Non-Medical	4	4	100	**4**
MSBOT	M.Sc. Botany	4	4	100	**4**
MSMIC	M.Sc. Microbiology	3	3	100	**4**
MSZOO	M.Sc. Zoology	4	4	100	**4**
BSAG	B.Sc. (Hons.) Agriculture	64	63	98.43	**4**
BTFT	B.Tech. Food Technology	13	13	100	**4**
MSAGN	M.Sc. Agronomy	7	7	100	**4**
MSFT	M.Sc. Food Technology	2	2	100	**4**
MSGPB	M.Sc. Genetics and Plant Breeding	2	2	100	**4**
MSHOT	M.Sc.Horticulture	2	2	100	**4**
BAMU	B.A. (Hons.) Music (GurmatSangeet)	9	8	88.88	**4**
BAMU	B.A. (Hons.) Music (Instrumental)	5	5	100	**4**
BAMU	B.A. (Hons.) Music (Tabla)	2	2	100	**4**
MAMU	M.A. Music (Instrumental)	7	7	100	**4**
MAMU	M.A. Music (Vocal)	5	5	100	**4**
BED	B.Ed.	19	16	84.21	**4**
BSEC	B.Sc. (Hons.) Economics	3	3	100	**4**
MSEC	M.Sc. Agri. Economics	1	1	100	**4**
BCOM	B.Com. (Hons.)	15	14	93.33	**4**
MBA	MBA (Finance)	3	3	100	**4**
MBA	MBA (Marketing)	1	1	100	**4**
BTCS	B.Tech. (CSE)	14	14	100	**4**
BTET	B.Tech. (ETE)	5	5	100	**4**
BSN	B.Sc. Nursing	58	57	98.27	**4**
MSN	M.Sc. Nursing	15	15	100	**4**

Program Outcomes Attainment Level
(Year 2022-23)

Program Code	Program	Number of students appeared in the final year examination	Number of students passed in final year examination	Result %	PO Attainment level
BAHU	B.A. Humanities (2020)	41	29	70.73	**3**
BSPSY	B.Sc. (Hons.) Psychology(2020)	6	6	100.00	**4**
BSM	B.Sc. Medical (2020)	2	2	100.00	**4**
BSNM	B.Sc Non-Medical (2020)	6	6	100.00	**4**
BSAG	B.Sc. (Hons.) Agriculture(2019)	60	60	100.00	**4**
BTFT	B.Tech. Food Technology (2019)	7	7	100.00	**4**
BAMU	B.A. (Hons.) Music (Gurmat Sangeet) (2020)	6	5	83.33	**4**
BAMU	B.A. (Hons.) Music (Instrumental) (2020)	15	14	93.33	**4**
BED	B.Ed. (2021)	48	48	100.00	**4**
BSEC	B.Sc. (Hons.) Economics (2020)	6	5	83.33	
BCOM	B.Com. (Hons.) (2020)	18	17	94.44	
BTCS	B.Tech. (CSE) (2019)	7	7	100.00	**4**
MSPSY	M.Sc. Psychology(2020)	3	3	100.00	**4**
MSCH	M.Sc. Chemistry (2020)	1	1	100.00	**4**
MSPHY	M.Sc. Physics (2020)	2	2	100.00	**4**
MAPUN	M.A. Punjabi (2020)	5	5	100.00	**4**
MAEN	M.A. English (2020)	2	2	100.00	**4**
MSBOT	M.Sc. Botany (2020)	4	4	100.00	**4**
MSMIC	M.Sc. Microbiology (2020)	3	3	100.00	**4**
MSZOO	M.Sc. Zoology (2020)	4	4	100.00	**4**
MAMU	M.A.Music (Instrumental)(2021)	2	2	100.00	**4**
MAMU	M.A.Music (Vocal)(2021)	4	4	100.00	**4**
MSAGN	M.Sc. Agronomy (2020)	7	7	100.00	**4**
MSBT	M.Sc. Biotechnology (2020)	4	4	100.00	**4**
MSFT	M.Sc. Food Technology (2020)	2	2	100.00	**4**
MSGPB	M.Sc. Genetics and Plant Breeding (2020)	2	2	100.00	**4**
MSHOT	M.Sc.Horticulture (2020)	2	2	100.00	**4**
MSAGE	M.Sc. Agri. Economics(2020)	1	1	100.00	**4**
MED	M.Ed (2020)	2	2	100.00	**4**
MBA	MBA (Finance) (2020)	3	3	100.00	**4**
MBA	MBA (Marketing) (2020)	1	1	100.00	**4**
MSN	M.Sc. Nursing (2020)	15	15	100.00	**4**
MPH	MPH (2020)	7	7	100.00	**4**
PSBT	PhD Biotechnology (2019)	2	2	100.00	**4**
PSCS	PhD CSE (2016)	1	1	100.00	**4**
PSCS	PhD CSE (2017)	1	1	100.00	**4**
PSFT	PhD Food Technology (2017)	2	2	100.00	**4**
PSFT	PhD Food Technology (2018)	2	2	100.00	**4**
PSZOO	PhD Zoology (2018)	1	1	100.00	**4**
BSN	B.Sc. Nursing	61	60	98.36	**4**
PSCOM	PhD Commerce (2017)	1	1	100.00	**4**