

**SHRI GULAB SINGH GOVERNMENT DEGREE COLLEGE CHAKRATA (D.DUN)
DEPARTMENT OF BOTANY**

COURSE OUTCOME AND PROGRAM OUTCOME

B.Sc. Second year:

Programme Outcome (COs)

- This Degree course will provide knowledge on various fields of taxonomy of angiosperms and economic botany.
- This Course will provide knowledge and concepts about anatomy, embryology and elementary morphogenesis.
- The Course is helpful to understand ecology, remote sensing and environment with their importance.
- The course is helpful to understand about importance of biodiversity and need their conservation with conservation techniques.
- The syllabus is prepared to enable students for competitive exams in frontier areas of plant sciences.
- Students will be able to know about Pteridophytes, Gymnosperms and elementary Palaeobotany.

PAPER I (BBO-201) TAXONOMY OF ANGIOSPERMS AND ECONOMIC BOTANY

Course outcome (COs)

- Develop understanding about angiosperms origin and evolution, Taxonomy, nomenclature, and different systems of classification. Some examples of primitive angiosperms.
- Understanding about International Code of Botanical Nomenclature (ICBN), History, scientific naming of plants, priority, types, validity.
- Learn the techniques of collection and preservation of specimens for Herbarium and Museum.
- Develop understanding about important distinguishing characters, classification and economic importance of the different families of angiosperms.
- Know about Origin of cultivated plants, monophyletic and polyphyletic origin, centres of origin of some important crop plants.
- Understand about Origin, history, botanical features and cultivation of cereals, Legumes, oils and millets.
- Develop understanding about fruits (Apple, Banana, Citrus, Mango), Vegetables (Root, stem, leaf, and fruit vegetables), Fibres (Coir, Cotton, Flax, Jute) and Medicinal plants (*Aconitum*, *Atropa*, *Cinchona*, *Rauwolfia*, *Ephedra*), Common Timber yielding plants of Western Himalayas (Chir, Deodar, Sal Shisham and Teak).



Co-ordinator
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APER II: (BBO-202) ANATOMY, EMBRYOLOGY AND ELEMENTARY MORPHOGENESIS

Course outcome (COs)

- Develop understanding about the techniques for plant anatomy, different types of Meristems, characteristics and their functions.
- Understand about Various types of permanent tissues- Simple and complex tissues, structure of dicot and monocot root, stem and leaf.
- To understand about Secretory structures, Origin structure and function of vascular cambium including anomalous behaviour.
- Develop understanding about structure of xylem and phloem.
- Understand about structure of anther, micro sporogenesis and development of male and female gametophyte.
- Learn about structures of ovule, comparison with the bio sporic and tetra sporic types.
- Develop understanding about Pollination and fertilization.
- Develop understanding about Endosperm and embryo development, Polyembryony and apomixis and Seed germination and dormancy.
- Understand about Basic body plan of a flowering plant- modular type of growth, development of tree habit in higher plants
- Know about Plant growth regulators: Auxin, Gibberellin, Cytokinin and Abscissic acid and physiology of flowering, photoperiodism and vernalization.


PAPER III: (BBO-203) ECOLOGY AND REMOTE SENSING

Course outcome (COs)

- Develop understanding about definition and scope of ecology, Principles of environment, atmosphere, light, temperature, water and soil.
- Understand about Ecosystem: Types, biotic and abiotic components, food chain, food web, ecological pyramids and ecological niche.
- Learn about Productivity, energy flow and ecological energetics, Lindeman's concept of Energy Flow.
- Understand about Biogeochemical cycles, Community ecology, Population ecology, growth curves, carrying capacity and population fluctuation ecological succession.
- Develop understanding about Pollution different types of pollution, prevention and control, global warming, desertification and ozone depletion.
- Develop understanding about Biogeographical regions of India, vegetation types in Uttarakhand.
- Understand about Biodiversity, Biodiversity conservation: In situ and ex situ conservation, gene bank, Biosphere reserves, National parks and Sanctuaries
- Know about Soil erosion and conservation, conservation and management of natural resources.
- Develop understanding about remote sensing, aerial photography, principles and fundamentals of aerial photo interpretation.
- Develop understanding about Electromagnetic spectrum, satellite and sensors, remote sensing data acquisition, physical basis of remote sensing, aerial and space platforms, Image interpretation, role of remote sensing in ecology.


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DEPARTMENT OF BOTANY

COURSE OUTCOME AND PROGRAM OUTCOME

B.Sc. I Sem (NEP)

Programme Outcome (COs)


- This certificate course will provide knowledge on various fields of basic Botany.
- The syllabus is prepared to enable students for competitive exams in frontier areas of plant sciences.
- Students will be able to know about habit, habitat, morphology, anatomy and reproduction of various plant groups.

PAPER 1: MICROBES, ALGAE, FUNGI AND BRYOPHYTES (COURSE CODE: BOT101T) CREDIT: 4


Course outcome (COs)

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

- Develop understanding about the classification and diversity of different microbes including viruses, Algae, Fungi, Bryophytes and Lichens with their morphology, anatomy, reproduction and economic importance.
- Develop conceptual skill about identifying microbes, pathogens, biofertilizers, Algae, Bryophytes & lichens.
- Gain knowledge about developing commercial enterprise of microbial products.
- Learn host –pathogen relationship and disease management.
- Gain Knowledge about uses of microbes in various fields such as Industries, medical, agriculture etc.
- Understand the structure and reproduction of certain selected bacteria algae, fungi and lichens.


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COURSE OUTCOME AND PROGRAM OUTCOME

B.Sc. first year

Programme Outcome (COs)

- This Degree course will provide knowledge on various fields of Fungi, Elementary Microbiology and plant pathology.
- This Course will provide knowledge about algae and bryophytes and their scopes in various fields.
- The syllabus is prepared to enable students for competitive exams in frontier areas of plant sciences.
- Students will be able to know about Pteridophytes, Gymnosperms and elementary Palaeobotany.

PAPER I: (BBO-101) FUNGI, ELEMENTARY MICROBIOLOGY AND PLANT PATHOLOGY

Course outcome (COs)

- Develop understanding about History and salient features, classification of Fungi.
- Develop knowledge about Heterothallism, Parasexuality and economic importance of Fungi
- Develop understanding about Habitats, characteristics and symbiotic relationship in Lichen
- Develop understanding about General account of diversity, elementary principles of isolation and purification of microorganisms.
- Develop understanding about General structure, nutrition, reproduction of gram-negative and gram-positive bacteria.
- Develop knowledge about General account of viruses and mycoplasma.
- Develop critical knowledge about General symptoms of plant disease, symptoms, morphology, causal organisms, disease cycles and control measure of different plant disease.


PAPER II (BBO-102): ALGAE AND BRYOPHYTES


Course outcome (COs)

- Develop understanding about the classification and diversity of Algae and Bryophytes with their Habit, Habitat and thallus organisation.
- Develop understanding about Structure, reproduction and life cycles of different Genera of algae and bryophytes.
- Learn about Cyanobacteria, types of different life cycles, alternation of generations in algae.
- Understand about aquatic, terrestrial, epiphytic, parasitic, symbiotic algae and phytoplankton's


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- Learn about classification of the Bryophytes in accordance with the International Code of Botanical Nomenclature
- Know about morphology, anatomy, vegetative and sexual reproduction, development and structure of the sporophyte and mechanism of spore dispersal based on *Riccia* and *Marchantia*
- Understand about the alternation of generation in Bryophytes


PAPER III: (BBO-103) PTERIDOPHYTES, GYMNOSPERMS AND ELEMENTARY PALAEOBOTANY

Course outcome (COs)

- Develop understanding about General characters of the Pteridophytes, gymnosperms and their classification
- Understand about morphology and anatomy of the vegetative plant body and spore production organs (strobilus, sporocarp, sporophyll, sporangium and spores), sexual reproduction, male and female gametophytes and fertilization of Pteridophytes and Gymnosperms
- Understand about **Telome theory, Stelar system and its evolution**, Heterospory and seed habit in Pteridophytes, apogamy, agamospermy and apospory in ferns.
- Understand about fossils, types and process of fossilization, general idea about Geological era, Living fossils.


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