Programme and Course Outcomes
Department of Botany
Bahona College
(1 January, 2016 to 31 December, 2020)

Programme outcome (POs): As per Syllabus (B.Sc. Botany):

The B.Sc. - Botany curriculum is designed to equip students with subject domain knowledge and technical skills pertaining to plants in a holistic manner. It aims to train the students in all the areas of plant sciences with a unique combination of core and elective papers with significant interdisciplinary components as per CBCS. Students have exposure to cutting-edge technologies that are currently used in the subject. They are made aware about the social and environmental issues, significance of plants and their relevance to the national economy.

Course Outcomes (COs): As per Syllabus (B.Sc. Botany)

Botany (CBCS) – Core and Generic papers offered in Bahona College

Semester	Paper Code	Paper Title	Course outcome
TDC 1st Sem Core	BC101T BC101P	Microbiology and Phycology	On completion of this course, the students will be able to understand: 1. Various forms of microorganisms. 2. Characteristics of the microorganisms. 3. Economic importance of the microorganisms.
TDC 1st Sem Core	BC102T BC102P	Biomolecules and Cell Biology	On completion of this course, the students will be able to understand: 1. Biomolecules - carbohydrates, proteins, lipids and nucleic acids. 2. Bioenergetics 3. Enzymes, enzyme kinetics, enzyme inhibition 4. Cells – characteristics, organelles and different types of divisions
TDC 2nd Sem Core	BC203T BC203P	Mycology and Phytopathology	On completion of this course, the students will be able to understand: 1. Various types of fungi and their characteristics 2. Symbiotic associations formed by fungi 3. Application of fungi in various industrial and agricultural practices 4. Plant diseases caused by fungal and bacterial phytopathogens
TDC 2nd Sem Core	BC204T BC204P	Archegoniate	On completion of this course, the students will be able to understand: 1. General characteristics and life history of Archegoniates – Bryophytes, Pteridophytes, Gymnosperms; with detailed description of some genera. 2. Ecological and economic importance of Archegoniates. 3. Fossil plants, fossilization process with special reference to certain

			genera.
TDC 3rd Sem Core	BC305T BC305P	Anatomy of Angiosperms	On completion of this course, the students will be able to understand: 1. The basics of angiosperm anatomy with its scopes. 2. Structure and tissue organization in angiosperm plant body with properties of different plant tissues. 3. Meristematic tissues, types of meristems, different theories on tissue organization and plant body development. 4. Vascular cambium and development of wood. 5. Adaptive and protective tissues found in angiosperm plants.
TDC 3rd Sem Core	BC306T BC306P	Economic Botany	On completion of this course, the students will be able to understand: 1. The centers of origin of cultivated plants with special mention of Vavilov's work, the effects of crop domestication on the gene pool. 2. Morphology, processing and uses of frequently cultivated plants listed under the categories – cereals, legumes, sugar/starch source plants, spices, beverages, fat/oil source plants, natural rubber yielding plants, timbers, fibers, aromatic and petrocrops and drug yielding plants.
TDC 3rd Sem Core	BC307T BC307P	Genetics	On completion of this course, the students will be able to understand: 1. Mendelian genetics, its exceptions and extensions. 2. Extrachromosomal inheritance, linkage, crossing over and chromosome mapping. 3. Variation in chromosome number and structure. 4. Fine structure of gene and gene mutations. 5. Population and evolutionary

			genetics.
TDC 3rd Sem SEC	VM301	Basics of Vermicompost	On the completion of this course, the students will be able to understand: 1. Introduce vermiculture to the students as a sustainable process 2. Develop their understanding on the concept of bio-fertilizer/ vermicompost 3. Evaluate the implications of mass cultivation, inoculums preparation, quality control, and vermicomposting
TDC 4th Sem Core	BC408T BC408P	Molecular Biology	On completion of this course, the students will be able to understand: 1. Structure and function of nucleic acids in both prokaryotes and eukaryotes. 2. Central dogma, basics of DNA replication, transcription and post transcriptional modifications. 3. Translation and post translational modifications in protein.
TDC 4th Sem Core	BC409T BC409P	Plant Ecology & Phytogeography	On completion of this course, the students will be able to understand: 1. Basic concepts of interactions of living world with that of non-living world. 2. Properties of soil. 3. Different types of biotic interactions, population and community ecology, with an especial emphasis on plant communities. 4. Structure and functioning of ecosystem. 5. Basics of phytogeography and the different phytogeographical regions of India and the local vegetations of NE India.
TDC 4th Sem Core	BC410T BC410P	Plant Systematics	On completion of this course, the students will be able to understand: 1. Significance of systematics and the hierarchy levels of taxonomy. 2. Morphological features of

			angiosperms, and rules regarding nomenclature of higher plants. 3. Different systems of plant classification. 4. The features of biometrics, numerical taxonomy and cladistics. 5. Phylogeny and phytogeography of angiospermic plants. 6. Major families of angiosperms and their type genera in details.
TDC 4th Sem SEC	BS402	Paper Not Decided Yet	
TDC 5th Sem Core	BC511T BC511P	Reproductive Biology of Angiosperms	On completion of this course, the students will be able to understand: 1. Noteworthy contributions in the field Reproductive biology of angiosperms. 2. Development and structural details of male and female reproductive structures. 3. The event of fertilization and pos fertilization developments. 4. Anomalies such as polyembryony, parthenocarpy and apomixis.
TDC 5th Sem Core	BC512T BC512P	Plant Physiology	On completion of this course, the students will be able to understand: 1. Plant water relations and mineral nutrition. 2. Nutrient uptake and phloem translocation. 3. Chemical nature, bioassay and physiological roles of phytohormones. 4. Physiological processes involved in flowering.
TDC 5th Sem Core	BD501T BD501P	DSE-1: Analytical Techniques in Plant Sciences	On completion of this course, the students will be able to understand: 1. Imaging, imaging related techniques and cell fractionation. 2. Radioisotopes, their application in experimental plant science, principle and applications of spectrophotometry. 3. Different types of chromatographic

			techniques. 4. Protein and nucleic acid characterization using different techniques. 5. Biostatistical calculations required in experimental plant science.
TDC 5th Sem Core	BD502T BD502P	DSE-2: Bioinformatics	On completion of this course, the students will be able to understand: 1. Basics of bioinformatics and databases. 2. The details about nucleic acid and protein sequence databases. 3. The details of different types of sequence alignments. 4. Methods and software used in molecular phylogeny analyses. 5. Applications of bioinformatics.
TDC 5th Sem Core	BD503T BD503P	DSE-3: Research Methodology	On completion of this course, the students will be able to understand: 1. Basic concepts of research and general laboratory practices. 2. Collection of data and documentation of observations. 3. Overview of biological problems in key research areas. 4. Methods to study plant cell and tissue structure. 5. Different micro techniques used to study plants. 6. The art of scientific writing and its presentation.
TDC 5th Sem Core	BD504T BD504P	DSE-4: Industrial and Environmental Microbiology	On completion of this course, the students will be able to understand: 1. Scope of microbes in industry and environment, bioreactors/fermenters and fermentation processes. 2. Industrial production using microorganisms, microbe origin industrial enzymes and enzyme immobilization. 3. Microbes and quality of environment.

TDC 6th Sem Core	BC613T BC613P	Plant Metabolism	On completion of this course, the students will be able to understand: 1. Different breeding methods for crop improvement. 2. Quantitative inheritance. 3. Heterosis and inbreeding depression.
TDC 6th Sem Core	BC614T BC614P	Plant Biotechnology	On completion of this course, the students will be able to understand: 1. Plant tissue culture and recombinant DNA technology. 2. Gene cloning and transfer – methods and techniques involved. 3. Application of plant biotechnology for human welfare.
TDC 6th Sem Core	BD605T BD605P	DSE-5: Plant Breeding	On completion of this course students will be able to understand: 1. Develop conceptual understanding of plant genetic resources, plant breeding, gene 2. bank and gene pool. 3. Familiarize with genetic basis of heterosis. 4. Classify Sexual and Asexual modes of reproduction. 5. Explain monogenic and polygenic inheritance 6. Reflect upon the role of various non- conventional methods used in crop improvement.
TDC 6th Sem Core	BD606T BD606P	DSE-6: Natural Resource Management	On completion of this course students will be able to: 1. Understand the concept of different natural resources and their utilization. 2. Critically analyze the sustainable utilization land, water, forest and energy resources. 3. Evaluate the management strategies of different natural resources. 4. Reflect upon the different national and international efforts in resource management and their conservation

TDC 6th Sem Core	BD607T BD607P	DSE-7: Horticultural Practices and Post-Harvest Technology	On completion of this course students will be able to: 1. Understand the concept of different types of horticultural crops, their conservation and management 2. Examine the various branches of horticulture, fruit and vegetable crops, floriculture, medicinal and aromatic plants. 3. Critically evaluate different cultivation practices and disease management 4. Reflect upon different Landscaping practices and garden design
TDC 6th Sem Core	BD608T BD608P	DSE-8: Biostatistics	On completion of this course students will be able to: 1. Comprehend the fundamental concepts related to descriptive and inferential biostatistics. 2. Develop skills in data tabulation, its treatment, analysis, interpretation and graphical representation of data. 3. Analyze the implications of inferential statistics in biology. 4. Develop their competence in hypothesis testing and interpretation
TDC 1st Sem Generic	BG101T BG101P	Biodiversity (Microbes, Algae, Fungi, Lichen and Archegoniate)	On completion of this course students will be able to: 1. Understand the fundamental concepts related to microbes, algae, fungi and Embryophytes 2. Analyze the discovery and general structure of viruses 3. Examine the morphology and life-cycles of trentepohlia, ulva, kappaphycus, sargassum, turbinaria, grailaria, porphyra 4. Evaluate the significance of fungi and its different types 5. Analyze the anatomy and reproduction of Cycas and Pinus along with their ecological and economical importance

TDC 2nd Sem Generic	BG202T BG202P	Plant Ecology and Taxonomy	On completion of this course students will be able to: 1. Comprehend the basic concepts of plant ecology and taxonomy and botanical nomenclature 2. Analyze the characteristics of different plant communities. 3. Examine the structure and functions of eco-system. 4. Evaluate the significance of herbarium 5. Analyze the implications of biometrics, numerical taxonomy and cladistics
TDC 3rd Sem Generic	BG303T BG303P	Plant Anatomy and Embryology	On completion of this course students will be able to: 1. Understand the fundamental concepts of plant anatomy and embryology 2. Analyze and recognize the different organs of plant and secondary growth. 3. Examine the structure and functions of eco-system. 4. Evaluate the structural organization of flower and the process of pollination and fertilization.
TDC 4th Sem Generic	BG404T BG404P	Plant Physiology and Metabolism	On completion of this course, students will be able to: 1. Understand Water relation of plants with respect to various physiological processes. 2. Explain chemical properties and deficiency symptoms in plants 3. Classify aerobic and anaerobic respiration 4. Explain the significance of Photosynthesis and respiration 5. Assess dormancy and germination in plants 6. Differentiate anabolic and catabolic pathways of metabolism 7. Recognize the importance of Carbon assimilation in photorespiration

			8. Explain the ATP-Synthesis 9. Interpret the Biological nitrogen fixation in metabolism

Botany (Non CBCS) – Major and General papers offered in Bahona College

Semester	Paper Code	Paper Title	Course outcome
Semester-I Major	BOTMT-101 BOTMP-102	Algae, Fungi and Lichen Practical	On completion of this course, the students will be able to understand: 1. General characteristics of Algae, Fungi and Lichen along with their morphology, 2. Reproduction, Life cycle and economic importance.
Semester-II Major	BOTMT-201 BOTMP-202	Plant Pathology and Bryophytes Practical	On completion of this course, the students will be able to understand: 1. Plant diseases caused by fungal and bacterial phytopathogens 2. General characteristics and life history of Bryophytes with detailed description of some genera along with ecological and economic importance.
Semester-III Major	BOTMT-301 BOTMP-302	Pteridophytes, Gymnosperms, and Palaeobotany Practical	On completion of this course, the students will be able to understand: 1. General characteristics and life history of Pteridophytes, Gymnosperms with detailed description of some genera along with ecological and economic importance. 2. Fossil plants, fossilization process with special reference to certain genera.

Semester-III Major	BOTMT-303 BOTMP-304	Microbiology and Biotechnology Practical	On completion of this course, the students will be able to understand: 1. Various forms of microorganisms and the characteristics of the microorganisms along with economic importance of the microorganisms. 2. Plant tissue culture and recombinant DNA technology. 3. Genetic engineering and its merits –demerits. 4. Application of plant biotechnology for human welfare.
Semester-IV Major	BOTMT-401 BOTMP-402	Morphology and Taxonomy of Angiosperms Practical	On completion of this course, the students will be able to understand: 1. Morphological features of angiosperms, and rules regarding nomenclature of higher plants. 2. Different systems of plant classification. 3. The features of numerical taxonomy and cladistics. 4. Phylogeny and phytogeography of angiosperm plants. 5. Major families of angiosperms and their type genera in details.
Semester-IV Major	BOTMT-403 BOTMP-404	Cell Biology and Modern Laboratory Technique Practical	On completion of this course, the students will be able to understand: 1. Working principle, operations and applications of instruments used in biological sciences. 2. Microscopy: Types, working principle and uses. 3. Principle and applications of spectrophotometry. 4. Different types of chromatographic techniques.

Semester-V Major	BOTMT-501 BOTMP-502	Development and Reproduction in Angiosperms Practical	On completion of this course, the students will be able to understand: 1. The basics of angiosperm anatomy with its scopes. 2. Structure and tissue organization in angiosperm plant along with meristematic tissues, types of meristems, different theories on tissue organization and plant body development. 3. Vascular cambium and development of wood. Adaptive and protective tissues found in angiosperm plants. 4. Development and structural details of male and female reproductive structures. 5. The event of fertilization and post fertilization developments. 6. Anomalies such as polyembryony, parthenocarpy and apomixis
Semester-V Major	BOTMT-503 BOTMP-504	Genetics, Plant Breeding & Biostatistics Practical	On completion of this course, the students will be able to understand: 1. Mendelian genetics, its exceptions and extensions. 2. Extrachromosomal inheritance, linkage, crossing over and chromosome mapping. 3. Variation in chromosome number and structure. 4. Different breeding methods for crop improvement. 5. Heterosis and inbreeding depression. 6. Application of statistics in Biological science, Collection and classification of data and measurement of central tendency. 7. Test of significance and probability test.

Semester-V Major	BOTMT-505 BOTMP-506	Functional and Chemical Biology Practical	On completion of this course, the students will be able to understand: 1. Biomolecules - carbohydrates, proteins, lipids and nucleic acids. 2. Secondary plant products Terpenoids, Phenols, Flavonoids, Anthocyanin, Alkaloids etc. 3. Plant hormones and their roles.
Semester-V Major	BOTMT-507 BOTMP-508	Plant Ecology, Phytogeography and Evolution Practical	On completion of this course, the students will be able to understand: 1. Different types of biotic interactions, population and community ecology, with an especial emphasis on plant communities. 2. Structure and functioning of ecosystem. 3. Basics of phytogeography and the different phytogeographical regions of India and the local vegetation of NE India. 4. Organic evolution, mechanism of organic evolution, theories of organic evolution.
Semester-VI Major	BOTMT-601 BOTMP-	Plant Physiology Practical	On completion of this course, the students will be able to understand: 1. Plant water relations and mineral nutrition. 2. Nutrient uptake and phloem translocation. 3. Chemical nature, bioassay and physiological roles of phytohormones. 4. Physiological processes involved in flowering.

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Semester-VI Major	OTMT-603	Molecular Biology and Immunology	On completion of this course, the students will be able to understand: 1. Structure and function of nucleic acids in both prokaryotes and eukaryotes. 2. Central dogma, basics of DNA replication, transcription and post transcriptional modifications. 3. Translation and post translational modifications in protein. 4. Immunity and resistance in mammals, principle of antigen and antibody reaction 5. Interaction of plants with bacteria, virus, fungi, breeding of disease resistance.
Semester-VI Major	BOTMT-604 BOTMP-605	Biophysics and Bioinformatics Practical of 603 & 604 +Project	On completion of this course, the students will be able to understand: 1. Laws of thermodynamics, Concept of free energy. 2. X-ray crystallography, LASER and biological applications. 3. Radioisotopes, their application in experimental plant science, principle and applications of spectrophotometry. 4. Different types of chromatographic techniques. 5. Basics of bioinformatics and databases. 6. The details about nucleic acid and protein sequence databases. 7. The details of different types of sequence alignments. 8. Methods and software used in molecular phylogeny analyses.

			9. Applications of bioinformatics.
Semester-VI Major	BOTMT-606 BOTMP-607	Agro-technology and Sustainable Utilization of Plants Practical	On completion of this course, the students will be able to understand: 1. The centers of origin of cultivated plants with special mention of Vavilov's work, the effects of crop domestication. 2. Morphology, processing and uses of frequently cultivated plants listed under the categories – cereals, legumes, sugar/starch source plants, spices, beverages, fat/oil source plants, natural rubber yielding plants, timbers and fibers. 3. Aromatic and petrocrops and drug yielding plants.
Semester-I General	BOTGT-101	Algae, Fungi, Bacteria, Lichen, Virus, Plant Pathology	On completion of this course, the students will be able to understand: 1. General characters, Morphology, Classification, Reproduction, Life cycle and economic importance of Algae, Fungi,

	BOTGP-102	Practical	Bacteria and lichen. 2. Introduction to virus and plant pathology. 3. Various important plant diseases and their control measures.
Semester-II General	BOTGT – 201 BOTGP– 202	Bryophytes, Pteridophytes, Gymnosperms Practical	On completion of this course, the students will be able to understand: 1. General characteristics and life history of Bryophytes with detailed description of some genera along with ecological and economic importance. 2. General characteristics and life history of Pteridophytes, Gymnosperms with detailed description of some genera along with ecological and economic importance.
Semester-III General	BOTGT-301 BOTGP-302	Morphology, Taxonomy, Development and Reproduction of Angiosperms Practical	On completion of this course, the students will be able to understand: 1. Morphological features of angiosperms, and rules regarding nomenclature of higher plants. 2. Different systems of plant classification and the features of numerical taxonomy and cladistics. 3. Phylogeny and phytogeography of angiosperm plants. 4. Major families of angiosperms and their type genera in details. 5. The basics of angiosperm anatomy with its scopes. 6. Structure and tissue organization in angiosperm plant along with meristematic tissues, types of meristems, different theories on tissue organization and plant body development. 7. Vascular cambium and development of wood. Adaptive and protective tissues found in angiosperm plants. 8. Development and structural details of male and female reproductive structures. 9. The event of fertilization and post fertilization developments. Polyembryony, parthenocarpy and apomixis

Semester-IV General	BOTGT-401 BOTGP-402	Physiology & Economic Botany Practical	On completion of this course, the students will be able to understand: 1. Plant water relations and mineral nutrition. 2. Nutrient uptake and phloem translocation. 3. Chemical nature, bioassay and physiological roles of phytohormone. 4. Respiration: mechanism, significance. 5. Photosynthesis: mechanism, factors affecting photosynthesis, Calvin cycle, carbon fixation in ozone cycle. 6. Physiological processes involved in flowering. 7. Morphology, processing and uses of frequently cultivated plants listed under the categories – cereals, legumes, sugar/starch source plants, beverages, fat/oil source plants, natural rubber yielding plants, timbers and fibers.