

PRINCIPAL SUBJECT AREA

BOTANY

200 LEVEL COURSES

BT 201 Plant Diversity I (2 credits)

Basic concepts of biodiversity, levels (species, genetic, ecosystem); range of diversity in relation to size, life span, form, nutrition, reproduction, habitats, life cycles etc. Nomenclature and classification, importance of biodiversity, its conservation and sustainable utilization. Diversity among lower organisms: Monera (Prokaryota), Protista, algae, Chromista, Fungi. Basic characters, modern classification systems, range of form, reproduction and life cycles with reference to type examples. Importance of fungi in nature, biodeterioration, medicine, agriculture & industry. Laboratory exercises based on above topics.

Recommended Texts:

1. Pandey, B. P. (1994). *A Text Book of Botany*, Fungi. S. Chand & Co. Ltd., New Delhi.
2. Mehrotra, K.R & Anjela, K.R. (1990). *An Introduction to Mycology*. Wiley Eastern Ltd., New Delhi.

BT 202 Plant Diversity II (2 credits)

Diversity of non-vascular plants (Bryophytes) and vascular plants (Tracheophytes). General characteristics of Bryophytes. Occurrence and adaptations to habitat. Diversity in the gametophytic and sporophytic structure of some selected genera of mosses, liverworts and hornworts. Evolutionary tendencies exhibited by the sporophytes of the Bryophyta. General characteristics of Tracheophytes, diversity in morphology and anatomy of the sporophyte and sporangial structure of the Pteridophyta. Eusporangiate and Leptosporangiate ferns. Homosporous and heterosporous life cycle. Evolutionary tendencies among ferns. Gymnospermae – evolution and evolutionary relationship among gymnosperms, morphology, distribution, anatomical variations, uses, reproduction and propagation of gymnosperms. Angiosperm reproduction and life cycle.

Laboratory exercises based on above topics.

Recommended Texts:

1. Vashista, B. R. (1996). *Botany for degree students - Bryophyta*. S. Chand & Company Ltd. Rem Nagar, New Delhi – 110055, India
2. Vashista, P. C. (1996). *Botany for degree students – Pteridophyta*. S. Chand & Company Ltd. Rem Nagar, New Delhi - 110055, India
3. Vashista, P. C. (1996). *Botany for degree students – Gymnosperms*. S. Chand & Company Ltd. Rem Nagar, New Delhi - 110055, India
4. Biswas, C. and Johri, B. M. (1997). *The Gymnosperms*. Springer – Verlag and Narosa Publishing House. Berlin and New Delhi, India 494pp.

BT 203 Vegetation Dynamics and Measurement (2 credits)

Plant communities, vegetation measurements, physiognomic or structural data, floristic data, vegetation dynamics, disturbances, primary and secondary succession, pioneer and climax species.

Field and laboratory exercises based on the above.

Recommended Texts:

1. Kent, M. and Coker, P. (1992). *Vegetation description and analysis*. Wiley & Son, New York.
2. Clenn-Lewin, D.C., R.K. Peet and T.T. Veblen (1992). *Plant Succession: Theory and prediction*. Chapman & Hall, U.K., 246pp.
3. Kershaw, K.A. (1973). *Quantitative and Dynamic Plant Ecology*. 2nd Edition. Edward Arnold, U.K., 304pp.

BT 204 Enzymology (2 credits)

(Equivalent to MB 221)

Enzymes as biological catalysts, their structure, mode of action, mechanism of catalysis, classification and nomenclature. Co-factors, prosthetic groups and co-enzymes. Equilibrium constant of a reaction and free energy change, energy of activation. Mode of action of co-enzymes and principal co-enzymes. Kinetics of enzymatic reactions, effect of enzyme and substrate concentration on reaction rate, Michaelis Constant, Michaelis-Menton kinetics for single and bi-substrate reactions. Linear representations. Effect of chemical and physical agents on kinetics, temperature, pH, inhibitors, allosteric effectors. Chromatographic and electrophoretic techniques. Enzyme and substrate assay techniques. Protein-ligand binding studies, immobilized enzymes, turn-over number. Catalytic efficiency of enzymes. Reaction-related specificity, substrate-related specificity. Industrial applications. Human disease related to defective enzymes.

Laboratory exercises based on above topics.

Recommended Texts:

1. Wilson, K. and Walker, K. M. (1994). *Principles and Techniques of Practical Biochemistry* (4th edition). Cambridge University Press. UK.
2. Weil, J. H. (1990). *General Biochemistry* (6th edition). Wiley Eastern Limited, New Delhi, India.

BT 205 Angiosperm Morphology and Anatomy (2 Credits)

Stem, root and leaf morphology, reproductive morphology, seedling morphology and vegetative morphology. Embryogenesis, apical meristems and their derivatives, growth, morphogenesis and differentiation, ground tissues, vascular tissues and dermal tissues. Structure and development of root and shoot, leaf anatomy, trichomes, secretory structures. Secondary growth, periderm and wood.

Laboratory exercises based on the above.

Recommended Texts:

1. Bell, A.D. *Plant Form. An illustrated guide to flowering plant morphology.*
2. James, G.H. and Melinda, W.H. (2001). *Plant Identification Terminology: An illustrated glossary.* 2nd Edition, Spring Lake Publication.
3. Raven, P.H., Evert, R.F. and Eichhorn, S.E. (1999). *Biology of Plants.* 6th Edition, Chapters 23-27, 555-670pp.

BT 206 Plant Physiology (2 credits)

Functions of water in plant, concept of water potential and its measurements, water balance of the plant. Overview of soil-plant-atmospheric continuum, active and passive absorption of water. Stomatal physiology, solute transport in apoplast and symplast, passive and active transport of solutes across membrane barrier, essential nutrients in plants, nutrient solutions and deficiencies. Laboratory exercises based on above topics.

Recommended Texts:

1. Taiz, L & Zeiger E (1999). *Plant Physiology.* Benjamin Cummings Publishing Company, New York.
2. Hopkins, W.G. (1999). *Introduction to Plant Physiology.* John Wiley and Sons, New York.
3. Salisbury, F.B. & Ross, C.W. (1996). *Plant Physiology.* Wadsworth Publishers, London.
4. Kramer, P.J. & Boyer, J.S. (1996). *Water Relations of Plants and Soils.* Academic Press, London
5. Marschner, H. (1995). *Mineral Nutrition of Higher Plants.* Academic Press, London.

BT 207 Plant Biochemistry I (2 Credits)

Photosynthesis as energy conversion, photosynthetic electron transport, mechanism of photophosphorylation. Fixation of carbon dioxide, C3 PCR cycle, C2 photorespiratory carbon oxidation cycle, CO₂ concentration mechanisms, C4 photosynthetic carbon assimilation cycle, Crassulacean Acid Metabolism. Synthesis of sucrose and starch, phloem translocation, loading and unloading. Plant respiration, glycolytic pathway, tricarboxylic acid cycle, electron transport and ATP synthesis.

Laboratory exercises based on above topics.

Recommended Texts:

1. Lehninger, A. L. (1990). *Principles of Biochemistry.* Worth Publishers Inc., New York.
2. Hall, D.D. & Rao, K.K. (1999). *Photosynthesis* (Sixth Edition). Studies in Biology Book Series. Cambridge University Press.
3. Taiz, L. & Zeiger, E. (1999). *Plant Physiology.* Benjamin Cummings Publishing Company, New York.
4. Hopkins, W.G. (1999). *Introduction to Plant Physiology.* John Wiley and Sons, New York.

BT 209 Biostatistics (2 credits)

(Equivalent to ST 202)

Variables, summarization & presentation of data, variance, standard deviation, standard error, probability of simple events, probability distribution (binomial, Poisson & Normal probability distribution), Z score, t-distribution, hypothesis testing (χ^2 test, paired & unpaired t-test), analysis of variance (ANOVA), CRD, RCBD and LSD, correlation and regression, use of statistical package e.g. Minitab.

Recommended Texts:

1. Fowler, J. & Cohen, L. (1990). *Practical statistics for field biology*. John Wiley & Sons, New York.
2. Sokal, R.R. & Rohlf, F.S. (1995). *Biometry*, 3rd Edition, W.H. Freeman & Co., New York.

FS 202 Food Science I (2 credits)

Chemistry of Food: Introduction to Food Science and the food Industry, basic food chemistry: definitions for food components, carbohydrates proteins, lipids, vitamins and minerals, additional food constituents; colours, flavours, emulsifiers, oxidants and antioxidants etc; Natural and synthetic constituents. Properties and significance of each component of food. Tests for identification. Food Analysis: sampling techniques and proximate analysis of food.

Food Technology : Fruit and vegetable technology: physical, chemical and biological methods used in preservation, common unit operations. Post harvest handling of fruits and vegetables. Grain technology: Cereals and pulses-composition, structure, effect of processing, functional properties, post harvest technology. Food of animal origin: problems associated with keeping quality of meat, fish, eggs and milk, Methods of processing. Laboratory work based on above topics.

Recommended Texts:

1. Kirk, R.S. and R. Sawyer (1991). *Pearson's Composition and Analysis of Food*, Longman, Singapore.
2. Vanderwerf, C.A. (1960). *Food Chemistry*, Reinhold Organic Chemistry and Biochemistry Textbook series.