



Seme ster	Course	Course Title	Ins. Hrs / Week	Credit	Exam Hrs	Marks		Total
						Int.	Extn.	
I	Core Course – I (CC)	Chemistry of Biomolecules	6	4	3	25	75	100
	Core Course – II (CC)	Analytical Techniques	6	4	3	25	75	100
	Core Course – III (CC)	Enzymes and Enzyme Technology	5	4	3	25	75	100
	Core Course – IV (CC)	Cell Biology and Physiology	5	4	3	25	75	100
	Core Practical- I (CP)	Practical – I (Biochemical Techniques and Enzymology)	8	4	3	40	60	100
	Total			30	20			
II	Core Course – V (CC)	Metabolism and Regulation	6	5	3	25	75	100
	Core Course – VI (CC)	Molecular Biology	6	5	3	25	75	100
	Core Practical - II (CP)	Practical – II (Molecular and Microbial Techniques)	8	4	3	40	60	100
	Elective – I (EC)	Biostatistics	5	5	3	25	75	100
	Elective – II (EC)	Microbiology	5	5	3	25	75	100
	Total			30	24			
III	Core Course – VII (CC)	Immunology	6	5	3	25	75	100
	Core Course – VIII (CC)	Clinical Biochemistry	6	5	3	25	75	100
	Core Practical - III (CP)	Practical – III (Clinical Biochemistry)	8	4	3	40	60	100
	Elective – III	Genetic Engineering	5	5	3	25	75	100
	Elective – IV	Developmental Biology	5	5	3	25	75	100
	Total			30	24			
IV	Core Course –IX (CC)	Endocrinology	5	5	3	25	75	100
	Core Course – X (CC)	Bioinformatics	5	5	3	25	75	100
	Core Practical- IV (CP)	Practical – IV (Phytochemistry, Soil Analysis and Immunological Techniques)	8	4	3	40	60	100
	Elective – V	Ecology and Environmental Sciences	5	4	3	25	75	100
	Project Work	Dissertation=80 Marks [2 reviews –20+20=40 marks Report Valuation = 40 marks] Viva = 20 Marks	7	4	-	-	-	100
	Total			30	22			
Grand Total			120	90				2000

Core Paper	-	10
Core Practical	-	4
Elective	-	5

Note:

1. Theory	Internal	25 marks	External	75 marks
2. Practical	"	40 marks	"	60 marks

3. Separate passing minimum is prescribed for Internal and External

- a) The passing minimum for CIA shall be 40% out of 25 marks (i.e. 10 marks)
- b) The passing minimum for University Examinations shall be 40% out of 75 marks (i.e. 30 marks)
- c) The passing minimum not less than 50% in the aggregate.

ELECTIVE IV

DEVELOPMENTAL BIOLOGY

Objectives:

1. To study the cellular basis of development.
2. To elucidate the early development process of humans.

Unit I

Basic concepts: General concept of organisms development: Potency, commitment, specification, induction, competence, determination & differentiation; morphogenetic gradients; cell fate & cell lineages; genomic equivalence and cytoplasmic determinants; imprinting. General principles of cell-cell communication in development: cell adhesion and roles of different adhesion molecules, gap junctions, extracellular matrix, integrins, paracrine factors.

Unit II

Fertilization, development and sex determination in humans: Gametogenesis - Sperm & Egg formation; ultra structure of sperm and ovum, egg types, egg membrane. Fertilization, cleavage, Morula, Implantation, blastulation, gastrulation, formation of germ layers, axis formation - anterior and posterior. Sex determination - chromosomes and environment.

Unit III

Morphogenesis and organogenesis in animals: Cell aggregation and differentiation in Dictyostelium; axes and pattern formation in Drosophila, amphibia and chick; organogenesis - vulva formation in Caenorhabditis elegans; eye lens induction, limb development and regeneration in vertebrates; differentiation of neurons, post embryonic development-larval formation, metamorphosis; environmental regulation of normal development; sex determination.

Unit IV

Morphogenesis and organogenesis in plants: Organization of shoot and root apical meristem; shoot and root development; leaf development and phyllotaxy; transition to flowering, floral meristems and floral development in Arabidopsis and Antirrhinum.

Unit V

Implications of developmental biology: Medical implications of developmental biology - genetic disorders in human development, environmental assaults on human development, Future therapies, Environmental regulation of animal development - Environment as a part of normal development, Polyphenisms, plasticity and Learning.

Reference Books

1. Developmental Biology, (Ed: 9) - Gilbert S.F. Sinauer Associates Inc. Massachusetts, USA, 2010.
2. Developmental Biology, TMH Edition, Berrill N.J, 1974.
3. Animal Regeneration- Diwan A.P., Dhakad N.K., Anmol Publications Ltd, India, 1996.
4. Developmental Biology- Browder L.W., Erickson C.A., and Jeffery W.R, Saunder College Publishing House, Philadelphia, USA, 1991.
5. Genetics, 3rd edition- Strickberger, Prentice Hall of India, 2002.
6. Genes VII- Benjamin Lewin, Oxford University Press, 2000.
7. Genetics- Sarin C, Tata McGraw–Hill Publishing Co., Ltd., New Delhi, 1990.
8. Genetics- Gupta PK, Rastogi Publications, Meerut, India, 1996.
9. Molecular Biology of the Cell, (Ed: 3) - Alberts B, Garland Science, USA, 2002.
10. Evolutionary Developmental Biology (2nd edition) - Brian K. Hall, Kluwer Academic Publishers, 1999.

ELECTIVE COURSE V
ECOLOGY AND ENVIRONMENTAL SCIENCES

Objectives:

To study the physical and biological characters of the environment and the inter- relationship between biotic and abiotic components of nature as well as relationship among the individuals of the biotic components

Unit I

Environment – Physical environment: atmosphere (air), hydrosphere, lithosphere properties, interrelationship with living organisms. Abiotic and biotic environment and their interactions. Species interactions; types, interspecific competition, herbivory, carnivory, pollination, symbiosis. Population ecology – Population characteristics, population growth curve, population regulation, life history strategies (r and K selection); concept of meta population demes and dispersal, interdemic extinctions, age structured populations.

Unit II

Community ecology: Nature of communities, community structure and attributes, levels of species diversity and its measurement, edges and ecotones. Concept of habitat and niche, types of niche, niche width and overlap, fundamental and realized niche, resource partitioning, character displacement.

Unit III

Ecological succession and Ecosystem Ecology: Ecological succession types, mechanisms, changes involved in succession, concept of climax. Ecosystem structure, function, energy flow and mineral cycling (C, N, P, S), primary production and decomposition, structure and function of terrestrial (forest, grassland) and aquatic (fresh water, marine, estuarine) ecosystem.

Unit IV

Pollution: Environmental pollution, global environmental change, biodiversity; status, monitoring and documentation, major drivers of biodiversity change, biodiversity management approaches.

Unit V

Biogeography and Conservation Biology ; Major terrestrial biomes, theory of island biogeography, biogeographically zones of India. Principles of conservation, major approaches to management, Indian case studies on conservation/management strategy (Project Tiger, Biosphere reserves).

Reference books

1. Cell Biology, Genetics, Molecular Biology, Evolution And Ecology, P.S. Verma and V.K. Agarwal, S. Chand Company Ltd 2005.
2. Ecology and Environmental Biology, T.K. Saha, Books and Allied (P) Ltd, Kolkata 2011.
3. Modern concepts of Ecology, H.D. Kumar, 8th ed, Vikas Publishing House Pvt Ltd, 2008.
4. Fundamentals of Environment Biology, Dr. Biswarup Mukherjee, Silverline publications, 2008.
5. A Hand Book of Environmental Science, S S Negi, 2008.
6. A Text Book of Environmental Pollution, P. Panday, 2010.
7. A Text Book of Environmental Science, V. Thakur, 2012.
8. A Textbook of Environmental Science, Prabhat Patnaik, 2011.
9. A Textbook of Ecology, S.K. Dubey, 2012.