ECOLOGY, EVOLUTION AND PROTEOMICS

Sem	Sub. Code	Category	Lecture		Theory		Practical		Credits
			Hrs/ week	Hrs/ Sem.	Hrs/ week	Hrs/ sem.	Hrs/ week	Hrs/ sem.	
II	21CPBC2C	Core	4	45	4	45	-	-	4

COURSE OBJECTIVE:

- To appreciate the importance of ecology and evolution to motivate the students to attend competitive exams like CSIR, ICMR, SLET, etc.,
- To facilitate the students towards understanding the structural and functional importance of Proteins and proteome.
- To throw light on the various techniques in Proteomics

COURSE OUTCOMES:

On the successful completion of the course, the students will be able to,

CO Number	CO Statement	Knowledge Level ($K_1 – K_4$)
CO1	To understand the basics of Environment and ecology	**K1**
CO2	To understood the Characteristics features of Populations.	**K2**
CO3	To learn about the various process and importance of proteins and proteomics.	**K2**
CO4	To learn about various techniques involved in proteomics.	**K3**
CO5	To know the application of proteomics in research.	**K4**

(*CO – Course Outcomes

Knowledge Level: K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze).

MAPPING WITH PROGRAMME OUTCOMES:

COS	PO1	PO2	PO3	PO5	PO6
CO1	M	S	M	S	M
CO2	S	M	S	M	S
CO3	S	M	S	M	M
CO4	M	S	M	S	S
CO5	S	M	S	M	S

(S-Strong; M-Medium; L- Low)

Total Hours: 45

UNIT I

Environment and Ecological Succession **5 Hours**

Fundamental concepts: Abiotic and biotic components; scales (population, species, community, ecosystems, biomes); niches and habitats, Community ecology: Community assembly, organization and succession; species richness, evenness and diversity indices, species-area relationships; theory of island biogeography, Ecosystems structure and function: trophic levels and their interactions; nutrient cycles; primary and secondary productivity. Ecological succession - types, mechanisms, and changes involved in succession.

UNIT II

Behavioural Ecology and population **10 Hours**

Classical Ethology: Instinct; fixed action pattern; imprinting; learnt behavior; proximate. Sensory ecology: Neuroethology; communication (chemical, acoustic and visual signaling); recognition systems. Foraging ecology: Foraging behaviour; optimal foraging theory. Population ecology: Population growth rates (density dependent/independent); metapopulation ecology (colonization, persistence, extinction, patches, sources, sinks); age- structured populations.

UNIT III

Applied Ecology & Evolution **10 Hours**

Biodiversity and conservation: Importance of conserving biodiversity; ecosystem services; threats to biodiversity; invasive species; in-situ conservation (endemism, biodiversity hotspots, protected areas); ex-situ conservation; conservation genetics (genetic diversity, inbreeding depression); DNA barcoding. Disease ecology and evolution: Epidemiology; zoonotic diseases; antibiotic resistance; vector control. Global climate change: Causes; consequences; mitigation. Molecular evolution and phylogenetics: Neutral theory; molecular clocks; rates of evolution; phylogenetic reconstruction; molecular systematics.

UNIT IV

Proteomics and tools of Proteomics **10 Hours**

An introduction to proteomics: Basics of protein structure and function, An overview of systems biology, Evolution from protein chemistry to proteomics; The Proteome and Genome, the life and Death of a protein. Protein as Modular Structures, Functional protein families, deducing the proteome from the genome and protein levels. Abundance-based proteomics: Sample preparation and pre fractionation steps, Gel-based proteomics - two-dimensional gel electrophoresis (2-DE), two dimensional fluorescence difference in-gel electrophoresis (DIGE), Staining techniques.

UNIT V

Advanced proteomics and its applications **10 Hours**

Protein Structure - Relationship between protein structure and function, drug discovery, Proteins in disease and human proteomics. Computational approaches to protein interaction - protein structure prediction Tools and Determination of Protein Three-Dimensional Structure, Protein Structure Database. Challenges in Clinical Proteomics, Serum Proteomics, Urine Proteomics, Salivary Proteomics, Applications of proteomics.

DISTRIBUTION OF MARKS: Theory - 100% and Problems – Nil

TEACHING METHODOLOGY:

- Black Board
- Power Point Presentations
- Assignments
- Models
- Demonstrations

TEXT BOOKS:

S.NO	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
1.	Janine M Benyus	Biomimicry: Innovation Inspired by Nature	Perenneial	2001
2.	Eugene P. Odum	Fundamentals of Ecology Hardcover	Humana Press	2004
3.	Daniel C. Liebler	Introduction to Proteomics	Humana Press	1984
4.	Branden, C and J.Troze	Introduction to protein structure	John Wiley & Sons. Inc.	1999
5.	Baxevanis, A.D and Ouellette, B.F.F	Bioinformatics	Wiley interscience	2001

REFERENCE BOOKS:

S.NO	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
1.	Higgins, D and Taylor, W	Bioinformatics: Sequence, Structure and databank	Oxford University Press	2000
2.	Misener, S and Krawetz, S.A	Bioinformatics: Methods and Protocols	Replica press private limited	2001
3.	Eugene Odum	Fundamentals of ecology	Informa company	2005

WEB SOURCES:

- http://www.biology.arizona.edu/cell_bio/cell_bio.html
- https://ecok.libguides.com/biology/web_sources
- https://www.nicholls.edu/biol-ds/biol155/Lectures/Cell%20Biology.pdf
- http://www.bio-nica.info/Biblioteca/Bolsover2004CellBiology.pdf

SYLLABUS DESIGNER:

- Dr.K.Shoba, Assistant Professor of Bio-Chemistry