



Course plan

NAME OF THE DEPARTMENT	: Zoology
NAME OF THE FACULTY	: Dr. Anjana Verma, Dr. Kumari Pragati Nanda, Mr. Ankit
ACADEMIC SESSION	: September 2023
YEAR	: 2022-2026
PROGRAM	: FYUGP
SEMESTER	: III
COURSE TYPE	: Major
COURSE	: Cell Biology and Biostatistics
COURSE CODE	: MJ 4
TOTAL CREDIT	: 04

Program Outcomes (POs):

Student should be able to,

PO1- Apply the knowledge and concepts of biology and its fundamental principles and to identify, analyze and find solutions to various biological problems.

PO2- Identify, hypothesize, and review available research literature, and analyze complex biological issues reaching substantiated conclusions using knowledge of biodiversity, environment, and biological functioning.

PO3- Develop scientific temperament, an ability to merge, interconnects and extrapolates information and knowledge across various streams.

PO4- Ability to decide appropriate technology and tools to solve problems. Understand the availability, of resources, their judicious use, and the execution of the project in sustainable way.

PO5- Design solutions for complex scientific problems and design processes that meet the specified needs with appropriate consideration for public health & safety, cultural, societal, legal, constitutional and environmental considerations.



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PO6- Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.

PO7- Communicate effectively on complex scientific activities with the science community and with society at large, such as, being able to comprehend and write effective reports and design documents, make effective presentations, and give and receive clear instructions.

PO8- Demonstrate knowledge and understanding of the scientific principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO9- Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of scientific developments, technological advancements and global changes.

PO10- Value and foster Physical, Physiological and Psychological well-being through personal practice and conduct. Ability to apply the learnings for a lifelong commitment to ethics in fulfilment of professional and social obligations.

PO11- Apply academic learning to promote higher studies, sustainable living through employment, and initiation of entrepreneurial advent to create opportunities and wealth for self and society.

PO12- Value and support social causes and rural development through service and philanthropic activities.

PROGRAM-SPECIFIC OUTCOMES (PSOs):

Student should be able to,

PSO1: An ability to demonstrate in-depth knowledge and understanding of the fundamental concepts, principles, and processes underlying the academic field of Zoology and its different subfields like animal diversity, principles of ecology, comparative anatomy and developmental biology of vertebrates, physiology, endocrinology, biochemistry, genetics, and evolutionary biology, animal biotechnology, applied Zoology, aquatic biology, immunology, reproductive biology, parasitology, entomology, apiculture, aquarium fish keeping, medical diagnostics, and sericulture.

PSO2: Development of procedural knowledge and merging it with the advanced techniques available to create different types of professionals in the field of Zoology and related fields such as Apiculture, Fisheries, Medical Diagnostics, Sericulture, Paleozoology, Ornithology, Herpetology, Forensics, Bioinformatics, and Arachnology.



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PSO3: Understand and appreciate the complexity of life processes, their molecular, cellular, and physiological processes, their genetics, evolution, and behavior, and their interrelationships with the environment.

COURSE OUTCOMES (COs):

1. CO 1: - Identify the fundamental structures and functions of cell organelles such as mitochondria, Golgi complex, endoplasmic reticulum, nucleus, chromosomes, ribosomes, and lysosomes.

2. CO 2: Describe the processes and mechanisms involved in cell cycle regulation, cell division (mitosis and meiosis), apoptosis, and cancer development.

3. CO 3:- Explain the principles and techniques of various methods used in cell culture, including the types of culture media, sterilization methods, and somatic cell hybridization.

4. CO 4: Analyze statistical data using methods such as mean, median, mode, standard deviation, chi-square test, t-test, f-test, ANOVA, correlation, and regression analysis, and apply these analyses to biological research.

5. CO 5: Evaluate the effectiveness of cell signaling pathways, including GPCR and RTK, and their regulation mechanisms in maintaining cellular communication and function.

CORRELATION BETWEEN POs AND COs

POs → COs ↓	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	2	2	2	2	1	2	2	1	1	1	3	2
CO2	2	3	2	2	3	3	2	2	2	2	1	1	3	2
CO3	2	2	2	3	3	2	2	2	2	1	2	1	3	3
CO4	1	2	1	1	2	2	2	2	1	1	1	1	2	3
CO5	3	3	2	2	3	3	2	2	3	1	2	1	3	3

1. Weak

2. Moderate

3. Strong

Course teaching and learning activities



A. PEDAGOGY

- i. Whiteboard
- ii. Flipped Class
- iii. Debate
- iv. Group Discussions
- v. PPT
- vi. Technology based learning
- vii. Lab work

B. COURSE COMPLETION PLAN

UNIT	NO. OF LECTURES		TEST	QUIZ	ASSIGNMENT
	THEORY	TUTORIAL			
1	19		1	1	1
2	7				
3	12				
4	4				
5	10				
6	8				
7	9				

A. SUGGESTED READINGS

a. TEXT BOOKS

1. Alberts, B., Johnson, A., Lewis, J., Raff, M., Roberts, K., & Walter, P. (2014). *Molecular Biology of the Cell* (6th ed.). Garland Science.
2. Cooper, G. M., & Hausman, R. E. (2013). *The Cell: A Molecular Approach* (6th ed.). Sinauer Associates.
3. Campbell, N. A., Reece, J. B., Urry, L. A., Cain, M. L., Wasserman, S. A., Minorsky, P. V., & Jackson, R. B. (2017). *Biology* (11th ed.). Pearson.
4. Snedecor, G. W., & Cochran, W. G. (1989). *Statistical Methods* (8th ed.). Iowa State University Press.
5. Prescott, L. M., Harley, J. P., & Klein, D. A. (2005). *Microbiology* (7th ed.). McGraw-Hill.

b. REFERENCE BOOKS

1. Karp, G. (2010). *Cell and Molecular Biology: Concepts and Experiments*. VI Edition.



2. John Wiley and Sons. Inc.

3. De Robertis, E.D.P. and De Robertis, E.M.F. (2006). Cell and Molecular Biology. VIII Edition. Lippincott Williams and Wilkins, Philadelphia.

a. VIDEO RESOURCE

1. Introduction to Cell Biology - CrashCourse:

<https://www.youtube.com/watch?v=URUJD5NEXC8>

2. Molecular Biology - Khan Academy: <https://www.youtube.com/watch?v=4PKjF7OumYo>

3. Mitosis and Meiosis - Amoeba Sisters: <https://www.youtube.com/watch?v=f-ldPgEfAHI>

b. WEB RESOURCES:-

1. Cell Biology - NCBI Bookshelf: <https://www.ncbi.nlm.nih.gov/books/NBK21475/>

2. Molecular Biology of the Cell - Garland Science:

<https://www.garlandscience.com/product/isbn/9780815344643>

3. Biology Online - Campbell Biology Resources: <https://www.campbellbiology.com/>

4. Khan Academy - Statistics and Probability: <https://www.khanacademy.org/math/statistics-probability>

5. MIT OpenCourseWare - Introduction to Biology: <https://ocw.mit.edu/courses/biology/7-012-introduction-to-biology-fall-2004/>

c. **E-RESOURCES:-** Students may refer to e-notes shared in their whatsapp group and the following e- resources.

1. Molecular Biology of the Cell (NCBI Bookshelf

<https://www.ncbi.nlm.nih.gov/books/NBK21054/>)

The Biology Project - Cell Biology (University of Arizona)

http://www.biology.arizona.edu/cell_bio/cell_bio

2. Cell Biology Lectures (MIT OpenCourseWare)

<https://ocw.mit.edu/courses/biology/7-06-cell-biology-spring-2007/>)

3. Statistics for the Life Sciences (Khan Academy)

<https://www.khanacademy.org/math/statistics-probability>

4. Biostatistics Resources (Coursera)

<https://www.coursera.org/specializations/biostatistics>