School of Science
B.Sc. (Zoology) Programme

Subject Code & Name: - BS03MJZOO2 Cell Biology and Genetics I

Teaching and Evaluation Scheme:

Teaching Scheme				Examination Scheme			
Credits				Component Weightage (%)			
				CCE		SEE	
L	T	P	Total	TH	PWE	TH	PWE
3	0	1	4	35	15	35	15

Programme Name	B.Sc. (Zoology)
Semester	III
Course Code	BS03MJZOO2
Course Title	Cell Biology and Genetics – I
Course Content Type (Th./Pr.)	Theory & Practical
Course Credit	4
Sessions+ Lab. Per Week	3 + 2
Total Teaching/Lab. Hours	45 Theory Hours+ 30 Practical Hours
* 2 Laboratory = 1 Session	

Learning Objectives

This subject is designed to provide students with a thorough understanding of the structure, function, and behavior of cells, as well as the mechanisms that regulate cellular processes.

1. To understand to the fundamental unit of life viz. Type of Cells and cell organelles along with method of staining and Microscopy.
2. To study the basics of genetics from chromosomes to Mendelian experiments.
3. To develop an understanding about Non Mendelian experiments.
4. To develop practical hand in cytological staining and empower analytical skill with solving genetic problems.

Prerequisites (if any)

- A good understanding of fundamental biological concepts, including cell structure, function, and basic genetics, is essential.

Learning Outcomes

On the Completion of this course, students will able to:

1. Students will understand the structures and purposes of basic components of prokaryotic and eukaryotic cells.
2. Students will be able to describe and explain the structure and function of various cellular organelles.
3. Understand Mendelian genetics, including concepts like genes, alleles, and genotypes.
4. Students will comprehend that Mendelian genetics is not universally applicable to all organisms.

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Detailed Contents		
UNIT	**TOPIC/SUB-TOPIC**	**TEACHING HOURS**
I	**Introduction and Scope of Cell Biology:** • Cell theory, Prokaryotic and Eukaryotic Cell characteristics, Size and Shape. • Cytological Techniques: Fixation, Fixatives, Sectioning and Staining. Microscopic Techniques: Compound, Phase-contrast, Electron microscopy. • Cell structure: Cell wall, Plasma membrane and Cytoplasm. • Cell organelles: Endoplasmic reticulum, Ribosomes, Mitochondria, Golgi complex, Lysosomes, Centrosome and Plastids.	15
II	**Genetic Material and Introduction to Genetics:** • Structure and function of Nucleolus, Structure, Types and functions of Chromosomes, chromatin and nucleosome. • Concepts of Genetics: Homozygote, Heterozygote, Hybrids, Genotype and Phenotypes. Back cross, Test cross and Reciprocal cross. • Mendelism: Monohybrid experiment, dominance hypothesis. • Dihybrid experiment, Law of segregation and Law of Independent assortment.	15
III	**Non -mendelian Genetics or ratios:** • Incomplete dominance in *Mirabilis.* • Codominance: Inheritance of coat color in Cattle and AB blood group in man, • Multiple Alleles and Inheritance of ABO Blood grouping and Rh Factor. • Polygenic inheritance in Man. • Lethal gene interaction in Plants, Mice and Man.	15

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Practical (s)	**30 Hours**

1. To study the ultrastructure of Prokaryotic and Eukaryotic Cell by multimedia/chart or model.
2. To study the fixatives and stains used to stain plant and animal tissues/cells.
3. To study the principle and structural composition of dissecting and compound microscope.
4. To study the principle and structural composition and applications of scanning electron microscope (SEM) and transmission electron microscope (TEM).
5. Study of electron microphotographs of eukaryotic cells for various cell organelles.
6. To study the type of Chromosomes.
7. To solve genetic problems based upon Mendel's Law of inheritance: Monohybrid, Dihybrid, back cross and test crosses.
8. To solve genetic problems based upon incomplete dominance in *Mirabilis jalapa.*
9. To solve genetic problems based upon Codominance: Inheritance of coat color in Cattle and AB blood group in man.
10. To solve genetic problems based upon Multiple Alleles and Inheritance of ABO Blood grouping and Rh Factor.
11. To solve genetic problems based upon Polygenic inheritance in Man.
12. To solve genetic problems based upon Lethal gene interaction in Mice.

Text Book(s)

1. Cell Biology: Zoology for B.Sc. Students by V K Agarwal, S Chand Publishing
2. Cell and Molecular Biology by P.K. Gupta
3. Cell Biology by C.B. Powar.
4. Textbook of Cell Biology by S. C. Rastogi
5. Cell Biology and Genetics by P.S. Verma & V.K. Agarwal, S. Chand Publishing
6. Cell Biology by B. M. S. Chandra
7. Molecular Cell Biology by Lodish (Indian Edition)
8. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology by S. P. Verma & V.K. Agarwal
9. Cell Biology, Biochemistry, Genetics and Molecular Biology by R. K. Gupta
10. Fundamentals of Cell Biology by N. K. Verma
11. A Textbook of Cell and Molecular Biology by R. C. Dubey
12. Cell Biology and Molecular Biology by N. Arumugam, Saras Publication.

Reference Books

1. Molecular Biology of the Cell by Alberts et al.
2. Cell and Molecular Biology by Gerald Karp
3. Essential Cell Biology by Alberts, Johnson, Lewis, Raff, Roberts, and Walter
4. The Cell: A Molecular Approach by Geoffrey M. Cooper

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5. Cell Biology by Thomas D. Pollard and William C. Earnshaw
6. કોષવિજ્ઞાન – પ્રા. વિનોદકાંત યૂનીલાલ શાહ અને ડૉ. અરવિંદભાઈ ભોગીલાલ વ્યાસ, યુનિવર્સિટી ગ્રંથ નિર્માણ બોર્ડ, ગુજરાત રાજ્ય
7. નિરવ કોલેજ પ્રાણીશાસ્ત્ર, ૧૦૩, યુનિટ ૩ કોષવિદ્યા/કોષ જીવવિજ્ઞાન, નિરવ પ્રકાશન
8. નિરવ કોલેજ પ્રાણીશાસ્ત્ર, ૧૦૩, યુનિટ ૪ જનીનવિદ્યા, નિરવ પ્રકાશન
9. નિરવ કોલેજ પ્રાણીશાસ્ત્ર, ૨૦૧, યુનિટ ૪A જનીનવિદ્યા, નિરવ પ્રકાશન

L:: Lecture, **T::** Tutorial , **P::**Practical

CCE:: Continuous and Comprehensive Evaluation

(CCE Theory includes Mid Semester Examination, Assignment, MCQ quizzes, Seminar, Reflective notes, class participation, case analysis and presentation, slip tests (announced/ surprised), attendance etc. or any combination of these)

PWE:: Practical Work Examination(PWE includes Laboratory practical work, project work, viva simulation exercise work etc.)

SEE:: Semester End Evaluation

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