

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

**DEPARTMENT OF BOTANY
COURSE CURRICULUM**

PART- A: Introduction			
Program: Bachelor in Life Sciences (Degree/Honors)		Semester - V	Session: 2024-2025
1	Course Code	BOSC-05 T	
2	Course Title	Cytology & Genetics	
3	Course Type	Discipline Specific course (DSC)	
4	Pre-requisite (if, any)	<i>As per program</i>	
5	Course Learning Outcomes (CLO)	At the end of the course, the students will be able: > Acquire knowledge of cell and its components. > Learn about the structure and function of membrane and cell division > Interpret Mendelian and non Mendelian genetics > Interpret linkage, crossing over and gene interaction	
6	Credit Value	3 Credits	Credit = 15 Hours - learning & Observation
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40
PART -B: Content of the Course			
Total No. of Teaching-learning Periods (01 Hr. per period) - 45 Periods (45 Hours)			
Unit	Topics (Course contents)		No. of Period
I	The cell, cell wall, plasma membrane : Cell structure and function; Characteristics of prokaryotic and eukaryotic cells; Structure, function and chemical composition of Plant cell wall. Plasma membrane structure and chemical nature; Membrane transport – Passive, active and facilitated transport, endocytosis and exocytosis. Nucleus: Structure-nuclear envelope, nuclear pore complex, nuclear lamina, molecular organization of chromatin; nucleolus. Cytoskeleton: Role and structure of microtubules, microfilaments and intermediary filament		12
II	Cell organelles, Division of Cell Mitochondria and Chloroplast; Structure and functions. Endoplasmic Reticulum – Structure, and functions, role in protein synthesis. Golgi Apparatus – organization, protein glycosylation, Lysosomes. Cell cycle, mitosis and meiosis; Regulation of cell cycle- checkpoints, role of protein kinases.		11
III	Mendelian genetics, Linkage and Crossing over; Mendelism: History; Principles of inheritance; terminology. Chromosome theory of inheritance; Autosomes and sex chromosomes; Probability and pedigree analysis; Non-Mendelian inheritance: Incomplete dominance and co-dominance. Gene interaction; duplicate, complimentary, supplementary, epistasis. Linkage and crossing over.		11
IV	Extrachromosomal Inheritance, Mutation : Extrachromosomal inheritance: Cytoplasmic inheritance in plants. Mutations; types, Molecular basis of Mutations; Mutagens – physical and chemical. Chromosomal aberration: Deletion, Duplication, Inversion, Translocation, Euploidy and Aneuploidy.		11
Keywords	Cytology, Cell division, Genetics, Mendelian genetics, Mutation		

Signature of Convener & Members (CBoS) :

- ① R. S. Jaiswal
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PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Cell Biology: Powar C. B. and Dagainawala H. I., Himalay Pub. House, Bombay
2. Cell biology by Karp, G. 2010.
3. Cell and Molecular Biology: Concepts and Experiments. 6th Edition. John Wiley & Sons. Inc.
4. De Robertis, E.D.P. and De Robertis, E.M.F. 2006. Cell and Molecular Biology. 8th edition Lippincott Williams and Wilkins, Philadelphia.
5. Genetics by P. K. Gupta, Rastogi Publication
6. Gytogenetics, Molecular biology and Plant breeding by P. K. Gupta, Rastogi Publication

Reference Books Recommended–

1. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. 2009 The World of of the Cell. 7th edition. Pearson Benjamin Cummings Publishing, San Francisco.
2. L.J. (2012). Becker's World of the Cell, Pearson Education Inc. U.S.A. 8th edition.
3. Hausman, R.E. (2009) The Cell: A Molecular Approach. 5th edition. ASM Press & Sunderland, Washington,
4. D.C.; Sinauer Associates, MA. 9. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. (2009) The World of the Cell. 7 th edition. Pearson Benjamin Cummings Publishing, San Francisco

Online Resources–

- e-Resources / e-books and e-learning portals
- www.swayam.ac.in
- www.ignou.ac.in
- www.egyankosh.ac.in
- www.iitm.ac.in
- www.eskillindia.org
- www.eshiksha.mp.gov.in
- www.vlab.co.in
- www.internshala.com
- www.ndl.iitkgp.ac.in

Online Resources–

- e-Resources / e-books and e-learning portals
- <https://www.cytology-iac.org/educational-resources/virtual-slide-library>
- https://www.asct.com/ASCTWeb/Content/Cytopreparation_Online_Course.aspx
- <https://www.mooc-list.com/tags/genetics>
- <https://www.coursera.org/learn/genetics-evolution>
- <https://www.my-mooc.com/en/mooc/introduction-to-genetics-and-evolution>
- http://rastogipublications.com/index.php?route=product/product&product_id=50
- <https://www.nou.ac.in/sites/default/files/sim/BSCBO>
- http://ysmubooks.am/uploads/MEDICAL_BIOLOGY.pilf

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): 30 Marks

End Semester Exam (ESE): 70 Marks

Continuous Internal Assessment (CIA): 30 (By Course Teacher)	Internal Test / Quiz-(2): 20 +20	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 30 Marks
	Assignment / Seminar - 10 Total Marks - 30	
End Semester Exam (ESE): 70	Two section – A & B Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20 Marks Section B: Descriptive answer type qts..1out of 2 from each unit-4x10=40 Marks	

Name and Signature of Convener & Members of CBoS:

① R. Purohit
② S. K. Saha
③ A. K. Saha
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COURSE CURRICULUM

PART- A: Introduction			
Program: Bachelor in Life Sciences (Degree/ Honours)		Semester - V	Session: 2024-2025
1	Course Code	BOSC-05	
2	Course Title	Lab. Course -05 (Cytology and Genetics)	
3	Course Type	Laboratory Course	
4	Pre-requisite (if, any)	As per program	
5	Course Learning Outcomes (CLO)	At the end of this course, students will be able to: <ul style="list-style-type: none"> ➤ Handle the Compound light Microscope and apply microscopy ➤ Achieve elaborate idea about cell staining procedures and mitotic plate observation & analysis ➤ Identify the various stages of cell division karyotype analysis Get practice of genetic crosses and genetic analysis. 	
6	Credit Value	1 Credits	Credit =30 Hours Laboratory or Field learning/Training
7	Total Marks	Max. Marks: 50	Min Passing Marks: 20
PART -B: Content of the Course			
Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)			
Module	Topics (Course contents)	No. of Period	
Lab./Field Training/ Experiment Contents of Course	<ol style="list-style-type: none"> 1. Staining technique of cell organelles. 2. Study of different stages of Mitosis. 3. Study of different stages of Meiosis. 4. Study of plant cell structure with the help of epidermal peel mount of Onion/Rhoeo/Crinum. 5. Demonstration of the phenomenon of protoplasmic streaming in <i>Hydrilla</i> leaves. 6. Counting the cells per unit volume with the help of haemocytometer. (Yeast/pollen grains) 7. Exercise on genetics (Mendelian ratio and test cross) 8. Karyotype of chromosomes. 9. Study of polytene and lampbrush chromosomes. 	30	
Keywords	Mitosis, Mendelian ratio, Karyotype, Chromosome.		

Signature of Convener & Members (CBoS) :

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PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Laboratory Manual of Cyto-technique and Chromosome handling By Sharma A K
2. Manual of Cytology, Ministry of Health & Welfare
3. Cytogenetics By PK Gupta.
4. Cell biology By C. B. Powar

Online Resources–

- e-Resources / e-books and e-learning portals
- www.swayam.ac.in
- www.ignou.ac.in
- www.egyankosh.ac.in
- www.iitm.ac.in
- www.eskillindia.org
- www.eshiksha.mp.gov.in
- www.vlab.co.in
- www.internshala.com
- www.ndl.iitkgp.ac.in

Online Resources–

- e-Resources / e-books and e-learning portals
- https://ijrbat.in/upload_papers/0410202102153609.%20Basarkar%20UG%20and%20%20Patil-Behere%20KP.pdf
- <https://www2.samford.edu/~djohnso2/44962w/334/mitosis.html>
- <https://www.findel-international.com/product/science/biology/prepared-slides/philip-harris-prepared-microscope-slide-set-meiosis-and-mitosis-set-of-9-slides/e8r06642>

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks

Continuous Internal Assessment (CIA): 15 Marks

End Semester Exam (ESE): 35 Marks

Continuous Internal Assessment (CIA): 15 (By Course Teacher)	Internal Test / Quiz-(2): 10 & 10	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
	Assignment/Seminar + Attendance - 05 Total Marks - 15	
End Semester Exam (ESE): 35	Laboratory / Field Skill Performance: On spot Assessment	Managed by Course teacher as per lab. status
	A. Performed the Task based on lab. work - 20 Marks	
	B. Spotting based on tools & technology (written) - 10 Marks	
	C. Viva-voce (based on principle/technology) - 05 Marks	

Name and Signature of Convener & Members of CBoS:

- ① P. B. Powar
- ② Behera
- ③ Sharma
- ④ Patil
- ⑤ Basarkar
- ⑥ Patil
- ⑦ Patil
- ⑧ Patil
- ⑨ Patil
- ⑩ Patil