Km. Mayawati Govt. Girls P.G. College, Badalpur, G.B. Nagar

Dept of Zoology: IIIrd Semester: Specializations-Cytology and cytogenetics

Assignments: M.Sc.-IIIrd Jan 2025- June-2025

Instructions for assignments

- *Mark of Each Assignment: 5 (Deduction of Marks: 1 mark deducted for Late Submission and 1 for late personation.)*
- Upload your assignments and project before due date on google classroom https://classroom.google.com/c/NjU0OTE3Nzc1NTYx?cjc=wchg4cj (Class code- wchg4cj)
- *Presentation mode (online/offline) will be update before presentation date depending upon situations.*
- *Submit your project to Prof. Dinesh C Sharma by 30-4-2025*
- *The teacher will revert your evaluated assignments and internals by email, you can check and raise your point of view (if any) within one week, after that marks will be uploaded.*
- Tentative date of internals: March and April 2025
- *All student presentations were recorded online and uploaded it on your **YouTube account**. Uplod the link of all 4 assignments on the google class.*
- *All of you have to visit Conserved Natural habitat/ Zoo/Century and submit a report with your selfie and entry ticket.*
- Students ensure your participation in Workshop/training/Course assigned by the department. Students can do any online course and submit its certificate on google class. You will allotted extra marks as per the duration of the course.
- Coordinate with Ms. Sumbul Zehra, Ms. Jyoti Sharma and Ms. Hinashi Pilwan for any support.

Class Roll No		H-4062: Advanced cell biology			H-4063: Chromosome and genomic organization			H-4064: Genomic analysis, immunogenetics			H-4065: Human and Microbial cytogenetics and molecular biology		
		Assignment & Presentation			*Assignment & Presentation*			*Assignment & Presentation*			*Assignment & Presentation*		
	Evaluator→	*Ms. Neetu Singh and Miss. Himanshi*			*Prof. Dinesh C. Sharma and Miss. Sumbul Zehra*			*Ms. Abhishek Jaiswal and Miss. Shelly Khari*			*Prof.. Dinesh C. Sharma and Miss. Jyoti Sharma*		
	Name of student	Topic	Submission Last date	Presentation last Date	Topic	Submission Last date	Presentation last Date	Topic	Submission Last date	Presentation last Date	Topic	Submission Last date	Presentation last Date
1	**Aarti**	Discuss the impact of circadian rhythm disruption on human health, focusing on shift workers, jet lag, and digital screen exposure.	1 Mar 25	10 Mar 24	Explain how the nucleosome and solenoid model influence gene expression regulation and discuss their role in aging and cancer epigenetics.	8 Mar 25	17 Mar 24	Explain the C-value paradox and discuss its relevance in the context of genome complexity and recent advances in genome sequencing technologies.	22 Mar 25	24 Mar 24	Discuss the molecular anatomy of eukaryotic chromosomes and its implications in modern genetic disorders.	29 Mar 25	31 Mar 24
2	**Bhumika Moral**	Explain how membrane transport mechanisms influence drug resistance in cancer therapy and antibiotic resistance in bacteria.	1 Mar 25	10 Mar 24	Discuss the molecular structure of telomeres and their role in cellular aging, cancer progression, and telomere-targeting therapies.	8 Mar 25	17 Mar 24	Describe the organization of genes in organelle genomes and analyze how mutations in mitochondrial and chloroplast genomes contribute to human and plant diseases.	22 Mar 25	24 Mar 24	Explain the role of metaphase chromosomes, centromeres, kinetochores, and telomere maintenance in cancer progression and aging.	29 Mar 25	31 Mar 24
3	**Chelsi Chaudhary**	Analyze the role of transmembrane proteins in COVID-19 infection, particularly ACE2 receptors, and their potential as drug targets.	1 Mar 25	10 Mar 24	How do Cot curves help in understanding genome complexity, and what is their significance in genome sequencing projects?	8 Mar 25	17 Mar 24	Discuss the principles and applications of Southern and fluorescence in situ hybridization (FISH) in genome analysis, particularly in cancer diagnostics and genetic disorders.	22 Mar 25	24 Mar 24	Describe heterokaryon selection in hybrid cell studies and its relevance in chromosome segregation disorders.	29 Mar 25	31 Mar 24
4	**Deepanjali Raj**	Describe how disruptions in cell-to-cell communication contribute to neurodegenerative diseases such as Alzheimer's and	1 Mar 25	10 Mar 24	Discuss how kinetochore and centromere abnormalities contribute to chromosomal instability and genetic disorders	8 Mar 25	17 Mar 24	Compare and contrast transposable elements in prokaryotes and eukaryotes, highlighting their role in genome evolution, antibiotic	22 Mar 25	24 Mar 24	Analyze modern molecular cytogenetic techniques for human chromosome analysis and their application in	29 Mar 25	31 Mar 24

		Parkinson's.			like Down syndrome and cancer.			resistance, and genetic disorders.			personalized medicine.		
5	**Geeta**	Explore the role of signal transduction pathways in targeted cancer therapies and discuss current advancements.	1 Mar 25	10 Mar 24	Explain how satellite DNA and in-situ hybridization techniques are used in diagnosing genetic disorders and detecting chromosomal abnormalities.	8 Mar 25	17 Mar 24	Explain the methods and significance of genome analysis in microbial genomes, Drosophila, and yeast, with an emphasis on their applications in biotechnology and disease research.	22 Mar 25	24 Mar 24	Investigate numerical and structural abnormalities of human chromosomes and their link to genetic diseases such as Down syndrome and Turner syndrome.	29 Mar 25	31 Mar 24
6	**Isha Kaushik**	Examine how altered cell adhesion properties contribute to metastasis in cancer and strategies to inhibit it.	1 Mar 25	10 Mar 24	Hwo does the structural difference between euchromatin and heterochromatin affect gene regulation, stem cell differentiation, and neurodegenerative diseases?	8 Mar 25	17 Mar 24	Discuss automated karyotyping techniques and their role in diagnosing chromosomal abnormalities such as Down syndrome and cancer-related genomic alterations.	22 Mar 25	24 Mar 24	Explain bacterial transformation, transduction, and conjugation with reference to antibiotic resistance in modern healthcare challenges.	29 Mar 25	31 Mar 24
7	**Kalpana**	Compare the organization of cells in normal tissues versus tumors, highlighting recent research in 3D cell culture models.	1 Mar 25	10 Mar 24	Discuss how CRISPR gene editing is influenced by the molecular structure of eukaryotic genes and its applications in disease treatment.	8 Mar 25	17 Mar 24	Describe the steps involved in the construction of a restriction map and its applications in genetic engineering and synthetic biology.	22 Mar 25	24 Mar 24	Describe different types of bacteriophages, focusing on the structure and morphogenesis of T4 phage, and their application in phage therapy.	29 Mar 25	31 Mar 24
8	**Km Shaheen**	Discuss the role of horizontal gene transfer in the evolution of antibiotic-resistant bacteria and its impact on public health.	1 Mar 25	10 Mar 24	How is totipotency used in stem cell therapy and cloning, and what are the ethical concerns surrounding its application?	8 Mar 25	17 Mar 24	Explain restriction fragment length polymorphism (RFLP) and discuss its applications in modern genetic studies, including forensic investigations and personalized medicine.	22 Mar 25	24 Mar 24	Evaluate the cytogenetic effects of ionizing and non-ionizing radiation with reference to occupational exposure and environmental hazards.	29 Mar 25	31 Mar 24
9	**Mansi Kumari**	Evaluate the significance of epigenetics in regulating the eukaryotic genome and its implications for precision medicine.	1 Mar 25	10 Mar 24	Discuss the role of nuclear transplantation experiments in amphibians in advancing cloning technology and conservation of endangered species.	8 Mar 25	17 Mar 24	Evaluate the choice of mapping populations in genetic studies, focusing on the importance of simple sequence repeat (SSR) loci in plant and animal breeding programs.	22 Mar 25	24 Mar 24	Discuss the genetics of the cell cycle and cyclin-independent kinases in the development of cancer and targeted therapies.	29 Mar 25	31 Mar 24
10	**Mansi Sharma**	Explain how CRISPR technology is being used to modulate gene expression for disease treatment.	1 Mar 25	10 Mar 24	How do variations in genome size impact evolution, adaptation, and disease susceptibility, especially in rapidly evolving viruses like COVID-19?	8 Mar 25	17 Mar 24	Conduct a molecular analysis of genomic DNA in yeast or another eukaryote and discuss how such studies contribute to advancements in genetic engineering and drug discovery.	22 Mar 25	24 Mar 24	Explain DNA synthesis and its role in genome stability, with reference to CRISPR-based gene editing.	29 Mar 25	31 Mar 24
11	**Neeshu Rani**	Discuss the application of flow cytometry in immunophenotyping and the diagnosis of hematological malignancies.	1 Mar 25	10 Mar 24	How does non-coding DNA contribute to gene regulation, evolutionary biology, and neurological disorders like autism and schizophrenia?	8 Mar 25	17 Mar 24	Explain the role of molecular markers in genome analysis and their applications in improving crop varieties and understanding human genetic diseases.	22 Mar 25	24 Mar 24	Compare DNA replication mechanisms in prokaryotic and eukaryotic cells, and discuss their significance in synthetic biology.	29 Mar 25	31 Mar 24
12	**Neha Rani**	Investigate the role of cellular senescence in aging and its potential reversal through anti-aging therapies.	1 Mar 25	10 Mar 24	Explain how transposable elements (mobile DNA) contribute to genetic mutations, cancer development, and antibiotic resistance in bacteria.	8 Mar 25	17 Mar 24	Discuss how molecular markers are linked to disease genes and their significance in identifying genetic predispositions to diseases such as cancer, Alzheimer's, and cardiovascular disorders.	22 Mar 25	24 Mar 24	Explore DNA damage and repair mechanisms, highlighting their importance in cancer treatment and radiation therapy.	29 Mar 25	31 Mar 24
13	**Rita Nagar**	Compare necrosis and apoptosis in the context of inflammatory diseases such as rheumatoid arthritis and sepsis.	1 Mar 25	10 Mar 24	How do chromosomal structural changes contribute to diseases like leukemia and congenital disorders?	8 Mar 25	17 Mar 24	Analyze the applications of RFLP in forensics, disease diagnosis, genetic counseling, germplasm maintenance, and taxonomy, with examples of recent case studies.	22 Mar 25	24 Mar 24	Explain transcription in prokaryotic and eukaryotic cells and its regulation in response to environmental stress conditions.	29 Mar 25	31 Mar 24
14	**Riya Sharma**	Explain the importance of *Thermus aquaticus* in the development of PCR technology and its impact on modern disease	1 Mar 25	10 Mar 24	Discuss how the dysregulation of genes controlling cell division leads to tumor formation, and explore potential gene therapy treatments.	8 Mar 25	17 Mar 24	Describe the structure of immunoglobulin (Ig) genes and discuss their role in immune system function and the development of	22 Mar 25	24 Mar 24	Discuss DNA and RNA polymorphisms and their application in forensic science and ancestry determination.	29 Mar 25	31 Mar 24

		diagnosis.						monoclonal antibody therapies.					
15	**Sakshi Bhardwaj**	Discuss the adaptations of thermophilic organisms to extreme environments and their potential applications in biotechnology.	1 Mar 25	10 Mar 24	How do defective checkpoint mechanisms contribute to uncontrolled cell division, and what are the latest advances in cancer treatment targeting checkpoint proteins?	8 Mar 25	17 Mar 24	Explain the multigene organization of Ig genes and its significance in antibody production, immune system disorders, and vaccine development.	22 Mar 25	24 Mar 24	Explain the regulation of gene expression in prokaryotes with examples of antibiotic resistance genes.	29 Mar 25	31 Mar 24
16	**Sakshi Sharma**	Assess the ethical, medical, and environmental implications of cloning in agriculture, medicine, and conservation.	1 Mar 25	10 Mar 24	Compare the roles of oncogenes and tumor suppressor genes, and explain how targeted therapies are revolutionizing personalized cancer treatment.	8 Mar 25	17 Mar 24	Discuss the mechanisms of DNA rearrangements and how they contribute to the generation of antibody diversity, with an emphasis on immune responses to emerging infectious diseases.	22 Mar 25	24 Mar 24	Analyze the regulation of gene expression in eukaryotes and its role in stem cell research and regenerative medicine.	29 Mar 25	31 Mar 24
17	**Shivani Rana**	Evaluate the role of next-generation sequencing (NGS) in personalized medicine and early disease detection.	1 Mar 25	10 Mar 24	How do chemical exposure, radiation, and lifestyle factors contribute to oncogene activation and cancer progression?	8 Mar 25	17 Mar 24	Explain the role of DNA rearrangements in the expression of T-cell receptors and their importance in immunotherapy and autoimmune disease research.	22 Mar 25	24 Mar 24	Describe the translation machinery in prokaryotes and its significance in developing novel antibiotics.	29 Mar 25	31 Mar 24
18	**Smriti Gautam**	Explain how FISH and GISH techniques are used in biodiversity conservation and crop improvement programs.	1 Mar 25	10 Mar 24	Explain the role of genomic imprinting in disorders like Prader-Willi syndrome and Angelman syndrome, and discuss the impact of epigenetic drugs.	8 Mar 25	17 Mar 24	Define genetic screening and evaluate its ethical, legal, and social implications, particularly in prenatal testing, cancer risk assessment, and rare genetic disorder detection.	22 Mar 25	24 Mar 24	Explain the translation machinery in eukaryotes and its relevance in neurodegenerative disorders such as Alzheimer's disease.	29 Mar 25	31 Mar 24
19	**Tanu Nagar**	Analyze how RFLP is used in forensic investigations and its role in identifying genetic predisposition to diseases.	1 Mar 25	10 Mar 24	Discuss the mechanisms of dosage compensation (e.g., X-inactivation in mammals) and its relevance in understanding sex-linked diseases like Turner syndrome.	8 Mar 25	17 Mar 24	Trace the history of genetic counseling and compare traditional and modern methods, focusing on their role in managing hereditary diseases and the impact of direct-to-consumer genetic testing.	22 Mar 25	24 Mar 24	Discuss post-transcriptional modifications in polypeptides and their role in vaccine development, including mRNA vaccines.	29 Mar 25	31 Mar 24

Prof. (Dr.) Anita Rani Rathore
Principal

Prof. (Dr.) Dinesh C. Sharma
HOD-Zoology