



**Mahatma Gandhi University
Kottayam**

Programme						
Course Name	BIOLOGICAL BASIS OF BEHAVIOUR-II					
Type of Course	DSC B (for those who are opting BEHAVIORAL BIOLOGY as Minor)					
Course Code	MG2DSCZGY101					
Course Level	100					
Course Summary	<p>The course provides a comprehensive exploration of the molecular and genetic underpinnings of behavior. The syllabus covers a range of topics starting with an overview of animal cell structure and function, encompassing cellular diversity and the processes of cell division. Students delve into the intricacies of cell communication, including the basic principles and types of signaling, with a focus on signaling molecules such as neurotransmitters, hormones, and growth factors. The genetic component of behavior is extensively examined, covering fundamental genetic terminology, Mendelian laws, and Mendel's experiments, including monohybrid and dihybrid crosses. The course delves into the molecular basis of inheritance, exploring the structure of DNA, replication, transcription, and translation. Genetic mutations, both in terms of kinds and classifications, are discussed, along with associated disorders like albinism and phenylketonuria. Chromosomal aberrations, including Down syndrome and Klinefelter's syndrome, are examined, with emphasis on karyotyping and pedigree analysis. The course also touches upon important ethical considerations such as eugenics, euthenics, and genetic counseling. Overall, students gain a profound understanding of the intricate genetic mechanisms shaping physiological and behavioral traits.</p>					
Semester	II	Credits			4	Total Hours
Course Details	Learning Approach	Lecture	Tutorial	Practical	Others	
		3	--	1	--	75
Pre-requisites, if any						

COURSE OUTCOMES (CO)

CO No.	Expected Course Outcome	Learning Domains *	PO No
1.	Understand the basics of cell biology and key components of cell structure and function.	R, U	1,10
2.	Understand the fundamental genetic principles and molecular processes and to apply genetic principles by solving problems related to Mendelian genetics, & applying knowledge to analyze & interpret pedigrees.	R, U, A	1,2, 10
3.	Analyze gene mutations and chromosomal aberrations, and understand their implications in various genetic disorders	R, U, A, An	2,7, 10
4.	Evaluate the ethical considerations associated with genetics, including eugenics, eugenics, and genetic counseling	R, U, A, An	2,6,8
5.	Apply the knowledge gained from seminars and webinars to real-world scenarios, understand how the principles discussed influence health and well-being.	R, U, A, An	9
*Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)			

COURSE CONTENT

Content for Classroom transaction (Units)

Module	Units	Course description	Hrs	CO No.
1		Foundations of Life: Cellular Diversity, Division, and Communication	16	
	1.1	Overview of animal cell - Cellular diversity	2	1
	1.2	Cell division – Cell cycle, mitosis, meiosis	6	
	1.3	Cell communication - Basic principles of cell communications, Types of cell signaling (autocrine, paracrine, endocrine), signaling molecules (neurotransmitters, hormones, Growth Factors, Cytokines)	8	
2		Exploring Genetic Foundations of Behaviour	15	
	2.1	Genetic terminology – gene, allele, locus, genotype, heterozygote, homozygote, phenotype, character. Mendel's experiments- Monohybrid Cross, Dihybrid Cross, Mendel's Laws, Test Cross, Back Cross and Reciprocal Cross.	6	2

	2.2	Chromosome Theory of Inheritance. Sex - linked, sex – limited, sex-influenced characters	6	
	2.3	Molecular basis of inheritance- Structure of DNA. Brief account on Replication, transcription and translation.	3	
3		Genetic Variation and Disorders	14	
	3.1	Gene mutation-Kinds of mutation, classification (Somatic, gametic, point, spontaneous, induced, dominant, recessive and silent mutations)	3	1,2,3
	3.2	Chromosomal Aberrations - structural and numerical changes. Autosomal abnormalities (Down syndrome, Cri-du-chat syndrome) Sex chromosomal abnormalities (Klinefelters syndrome, Turner's syndrome)	5	3,4
	3.3	Ethical considerations in Human genetics- Karyotyping, Pedigree Analysis, Euthenics, Eugenics, Genetic Counseling	6	4
4		Practicals	30	
	1.	Study the structural features of DNA using a model		2
	2.	Identify and comment on Stages of Mitosis – based on images/permanent slides		1
	3.	Genetic problems on Monohybrid, Dihybrid Crosses.		2
	4.	Identify and comment on Mendelian disorders such as sickle cell anaemia, colour blindness – based on images		2
	5.	Identify and comment on the given Karyotype image - Normal male and female human karyotype		4
	6	Identify and comment on Chromosomal disorders based on the karyotype images – Downs, Edwards, Klinefelter's and Turner's syndromes		3
	7.	Identify and comment on the symbols used in pedigree charts		4
	8.	Construct a Pedigree chart for a given sex-linked inheritance (dominant and recessive)		4
5		Teacher Specific Module		

EVALUATION AND ASSESSMENT

<p>Teaching and Learning Approach</p>	<p>Classroom Procedure (Mode of transaction)</p> <p>Interactive Lectures, Discussions, Group discussions to explore evolutionary principles, ethical considerations, and the broader implications of physiological psychology, Case Studies and Real-world Examples, Guest Speakers and invited talks, Activities and Seminars, Technology Integration: Utilize multimedia resources, virtual models, and interactive platforms to enhance visual understanding of complex physiological processes.</p>
<p>Assessment Types</p>	<p>MODE OF ASSESSMENT</p> <p>A. Continuous Comprehensive Assessment (CCA):</p> <p>Theory Total = 25 Marks</p> <p>Quiz, Test Papers, Report on Case Studies and Real-world Examples, Report of invited talks, Seminar, Workshop, Conference</p> <p>Practical Total = 15 Marks</p> <p>Lab performance, record, test paper</p> <hr/> <p>B. End Semester Examination:</p> <p>Theory: Total = 50 Marks, Duration 1.5 hrs</p> <p>Short Essays - 5 out of 7 x 4 = 20 Marks</p> <p>Short questions - 10 out of 12 x 2 = 20 Marks</p> <p>Fill in the blanks - 5 x 1 = 5 Marks, MCQ - 5 x 1 = 5 marks</p> <p>Practical Total = 35 Marks; Duration - 2 hrs</p> <p>Record - 10 Marks</p> <p>Examination - 25 Marks:</p> <ol style="list-style-type: none"> 1. Identify the molecular composition of DNA using model – 5 Marks 2. Identify and comment on stages of mitosis/mendelian disorders/karyotype of Chromosomal disorders/normal karyotype of human - 6 Marks 3. Solve the given genetic problem - 8 Marks 4. Identify and comment on symbols in pedigree chart - 2 Marks; 5. Construct a pedigree chart for the given inheritance - 4 Marks

REFERENCES

1. Pierce, B.A. (2008). Genetics: A conceptual approach. W H Freeman and Company
2. Snustad, D.P. and Simmons, M.J. (2010). Principles of Genetics. John Wiley and Sons

SUGGESTED READINGS

1. Carlson, R.N. (2017). Foundations of Physiological Psychology (6th Ed.). New Delhi, Pearson Education, Inc
2. Gerard J. Tortora (2017). Principles of Anatomy and Physiology (14th Edition),

John Wiley & Sons.Inc

3. Guyton, A. Medical Physiology (8th ed.), W. B. Saunders' Co.
4. Kalat, J.W. (2018). Biological psychology. Cengage
5. Kenneth.S. Saladin (2011), Anatomy and Physiology (Sixth edition), McGraw–Hill Primis
6. Pinel,J.P. (2007). Biopsychology. India: Dorling Kindersley Pvt. Ltd.



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Syllabus Index