



Course Title: **Genetics**

Credit Units:

Course Level: UG

Course Code: **GCMB 205**

L	T	P/S	SW/FW	No. of PSDA	TOTAL CREDIT UNITS
2	1	2	-	3	4

Course Objectives: This course will provide each student with an understanding of the basics of hereditary mechanisms and fundamental genetic calculations

Pre-requisites: Knowledge of basic sciences and cell biology.

Course Contents/Syllabus:

	Weightage (%)
Module I	35
Descriptors/Topics - Mendelian inheritance. Gene interaction. Chi-square and probability. Penetrance and expressivity. Qualitative and quantitative inheritance. Sex linkage. Linkage and crossing over. Chromosome mapping in eukaryotes.	
Module II	10
Descriptors/Topics - Extranuclear inheritance and maternal inheritance :Variegation in Four o' clock plant, <i>Chlymodomonas</i> , Mitochondrial mutations in <i>Neurospora</i> /yeast, shell coiling in snails.	
Module III	20
Descriptors/Topics - Structure of DNA. Gene mutation-Transition, Transversion and Frame shift mutation, Molecular mechanism of mutation by chemical mutagen : tautomerisation, alkylation, deamination, base analogue incorporation	

Module IV	20
Descriptors/Topics - Types and meiotic behaviour of: Deletion, Duplication, Translocation, Inversion. Aneuploidy and polyploidy: Types, examples, meiotic behaviour and importance.	
Module V	15
Descriptors/Topics - One Gene–one polypeptide concept, Complementation test (rII locus), Split gene, Overlapping genes, Transposons. Genetic Counselling	
Lab Practicals 1. Mendelian laws and gene interaction studies. 2. Determination of goodness of fit in normal and modified mono-and dihybrid ratios (3:1, 1:1, 9:7, 13:3, 15:1, 9:3:3:1, 1:1:1:1) by Chi-square analysis and comment on the nature of inheritance . 3. Study of Human / <i>Phlox</i> / <i>Allium</i> Karyotype. 4. Pedigree analysis of some human inherited traits	

Student Learning Outcomes:

- Account for basic concepts of hereditary and population genetics and learn fundamental genetic calculations
- Explain the central role of genes in the inheritance of traits and the complex variations in inheritance patterns due to interaction of genes with each other and with the environment, and the common chromosomal and molecular mechanisms that underlie inheritance
- Students shall be able to account, explain and describe the role of genetic information in pedigree analysis and to inform at-risk individuals about the relevant genetic, biological and environmental risk factors related to the individual's inherited syndromes

Pedagogy for Course Delivery:

Lectures: 27

Tutorial: 13

Presentation/ Seminar: - 4

Class Test: 1

Total: 45

Lab/Practical: 26

Class Test :4

Total: 30

List of Professional Skill Development Activities (PSDA):

- i. Problem solving/critical thinking**
- ii. Group Discussion**
- iii. Communication/Team building**

Assessment/ Examination Scheme:

Theory L/T (%)	Lab/Practical/Studio (%)
75	25

Theory Assessment (L&T):

Continuous Assessment/Internal Assessment (30 %)					End Term Examination (70 %)
Components (Drop down)	Class Test	Home Assignment	Attendance		
Linkage of PSDA with Internal Assessment Component, if any		Problem solving and Group Discussion			
Weightage (%)	15	10	5		

Lab/ Practical/ Studio Assessment:

	Continuous Assessment/Internal Assessment (40 %)				End Term Examination (60%)		
Components (Drop down	Lab. Performance	Viva Voce	Attendance	Quiz on critical thinking	Lab. Performance	Viva-voce	Lab Records
Weightage (%)	20	5	5	10	40	10	10

Text:

1. Snustad, D.P., Simmons, M.J. (2009). Principles of Genetics. V Edition. John Wiley and Sons Inc.
2. Klug, W.S, Cummings, M.R , Spencer,C.A. and Palladino, M.A. Concept of Genetics, Pearson education IXth Edition(2009).
3. Gupta, P.K. Genetics; Classical to Modern. Rastogi Publication (2007).
4. Russell, P. J. (2009). *iGenetics- A Molecular Approach*. III Edition. Benjamin Cummings.