Gyanmanjari
Innovative University

Course Syllabus
Gyanmanjari Science College
Semester-1(M.Sc.)

Subject: Genetics, Evolution and Biostatistics- MSCMB11505

Type of course: Minor

Prerequisite: These courses provide students with basic concepts of genetics, evolution and biostatistics.

Rationale: To teach students to explore the relationship between these two fields of science. Genetics is the study of genes and heredity while evolution is the study of how living organisms change overtime. Biostatistics is a multidisciplinary field that combines statistics, biology and medicine.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
				Theory Marks		Practical Marks		CA	
CI	T	P	C	ESE	MSE	V	P	ALA	
3	0	0	3	60	30	10	00	50	150

Legends: CI-Class Room Instructions; T – Tutorial; P - Practical; C – Credit; ESE - End Semester Examination; MSE- Mid Semester Examination; V – Viva; CA - Continuous Assessment; ALA- Active Learning Activities.

Continuous Assessment:

Sr. No	Active Learning Activities	Marks
1	**Presentation** Faculty will assign topics and students will prepare presentations (Slideshow/video) and upload them to Moodle.	10
2	**Paper Review** Faculty will provide a particular portion of the research paper and a group of students will review it and prepare a conclusion in 100 words and upload it to Moodle.	10
3	**Chain notes** Faculty will provide a topic on that students have to prepare a series based on topic in chart form in hard copy and upload it to moodle.	10
4	**MCQ Test** Faculty will provide the students a set of MCQs according to the learning objective of the course and students will answer it individually on Moodle.	10
5	**Brain writing** Faculty will provide a picture, text passage or video clip, student observe, analyze and write about it.	10
	Total	**50**

Course Content:

Unit No	Course content	Hrs	% Weightage
1	**Chapter:1-Basics of Genetics** • **Gene concept:** Interaction of genes (complementary gene effects, Epistasis and its Types) • **Mendel's work on heredity:** Mendel's mono and dihybrid experiments. Mendel's Laws. Linkage and crossing over, coupling and repulsion hypothesis	15	25
2	**Chapter:2-Evolution theories** • **Inheritance of genes:** Sex-linked inheritance, Lethality in animals and humans. Non-chromosomal inheritance. • **Principles and theories of organic** • **Evolution:** Molecular basis of evolution, speciation. Stages in primate evolution including *Homo*.	15	25

3	**Chapter:3-Basic of Statistics** • **Application of computers in statistic:** Advantage of using a computer, MS Excel – statistical functions, • **Population and sample**: Sampling, sample size, sampling distribution, Finite and infinite population, necessity of sampling, methods of sampling. • **Variables**: Variables in Biology, Collection, classification and tabulation of data. • **Diagrams and Graphs**. Need, usefulness, guidelines, types.	15	25
4	**Chapter:4-Descriptive statistics** • **Frequency distribution**: Definition, relative and percent relative frequencies, discrete and continuous frequency distribution, cumulative frequency distribution, frequency graphs. • **Average:** Definition, objectives, types of averages. • **Deviation:** Mean deviation, standard deviation, interpretation of standard deviation, standard error, coefficient of variation, • **Hypothesis testing**: Hypothesis and null hypothesis, sampling distribution, level of Significance, ANOVA, correlation, regression, Chi-square test. Student's t-test, correlation, coefficient of correlation, regression.	15	25

Suggested Specification table with Marks (Theory):60

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	20%	40%	30%	10%	-	-

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

GYANMANJARI INNOVATIVE UNIVERSITY   GYANMANJARI SCIENCE COLLEGE

Course Outcome:

After learning the course the students should be able to:	
CO1	Learn in detail about classical Mendelian genetics, natural selection.
CO2	Get information about origins of hereditary variations and evolution.
CO3	Learn about biostatistics and multiple mathematical techniques.
CO4	Understand biostatistics for the data interpretation of the data.

Instructional Method:

The course delivery method will depend upon the requirement of content and the needs of students. The teacher, in addition to conventional teaching methods by black board, may also use any tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in the laboratory.

Reference Books:

1) Presscott's Microbiology Textbook by Christopher J.Woolverton Joanne M.Willey, and Linda Sherwood
2) Introduction to Biostatistics: A Guide to Design, Analysis and Discovery, RN Forthofer, Ronald N., Lee, Eun Sul, Academic Press, 1995.
3) An Introduction to Biostatistics by N, Gurumani.
4) Genetics by Farnsworth, (Hyper and Row).
5) Genetics by Verma and Agarwal.
6) Principle of Genetics by Gardner, Wiley Eastern Pvt. Ltd.