ST. ALOYSIUS COLLEGE (AUTONOMOUS), JABALPUR

Reaccredited 'A+ 'Grade by NAAC (CGPA:3.68/4.00)
College with Potential for Excellence by UGC
DST-FIST Supported & STAR College Scheme by DBT

Faculty of Science

Master of Science (M.Sc.)

SUBJECT: MICROBIOLOGY

M.Sc. II Semester

Paper- III

Core Paper

Biostatistics & Computer Application

Course Outcomes

CO.No.	Course Outcomes	Cognitive Level
CO1	Proficiency of students in various techniques of collection, collation, summarization and presentation of data.	U, Analyze
CO2	They could learn basic concepts of probability and probability distribution functions along with applications.	U, A
CO3	Understanding and applications of descriptive and inferential statistics enabling students to use tests of significance in biological data.	U,A
CO4	Can apply Analysis of Variance tools and different experimental designs to biological experiments, enabling them to minimize experimental and sampling errors.	U,A
CO5	Understands concepts of correlation and regression tools and techniques, attempts extrapolation and simulation of biological processes.	U, A
CO6	Empowers students to utilize software packages in digital analysis and processing of biological data	A
CO7	Integrate informatics with biology through data submission protocols, sequence alignment and searches, annotations and possible applications in human health and welfare.	A

Credit and Marking Scheme

	Credits	Marks		Total Marks
		Internal	External	
Theory	4	10	40 (Minimum Passing marks 13)	**50**
Practical	2	5	20	**25**
Total	**6**	**75**		

Evaluation Scheme

	Marks	
	Internal	**External**
Theory	1 Internal Exams of 10 Marks	1 External Exams (At the End of Semester)
Practical	Continuous Evaluation (5 marks)	1 External Exams (At the End of Semester)

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Content of the Course
Theory

No. of Lectures (in hours per week): 5 Hrs. per week
Total No. of Lectures: 60 Hrs. **Maximum Marks:** 40

Units	Topics	No. of Lectures
I	Importance and scope of statistics in biochemical experimentation; Elements of Probability-Mathematical and Statistical definitions; Addition and Multiplication theorems; Probability Distribution Functions – Binomial, Poisson and Normal; Area under normal distribution curve.	12
II	Measures of central tendency: Arithmetic, geometric & harmonic means; Measures of dispersion: range, quartile deviation, variance, standard deviation, coefficient of variation, confidence limits of population mean. Tests of significance hypotheses and errors; student t statistics- population mean equals a specified value; equality of 2 independent means (equal & unequal variance), equality of 2 means (paired samples).	12
III	Analysis of variance: one-way analysis (sample sizes equal and unequal), completely randomized design; two-way analysis (one observation per cell), randomized block design; multiple comparisons: least significant difference, Duncan's new multiple range test.	12
IV	Linear regression: regression diagram and equation, regression coefficient, standard error, significant tests, prediction of dependent variable from the independent variable; linear correlation- scatter diagram, correlation coefficient, standard error, significance tests; relationship between regression and correlation coefficients; Non parametric tests: Chi-square statistics, test of goodness of fit, test of independence of attributes; standard line interpolation.	12
V	Introduction to Computers: Basic architecture, generations of computer hardware and software; operating systems-WINDOWS and UNIX; system and application software; introduction to internet-LAN, MAN, WAN, Concept of bioinformatics; application of bioinformatics in microbiology.	12

List of Recommended Books

1. Statistics in biology, Vol. 1 by Bliss, C.I.K. (1967) McGraw Hill, NewYork.
2. Practical Statistics for experimental biologist by Wardlaw, A.C. (1985).
3. Programming in C by E. Ballaguruswamy
4. How Computers work - 2000. By Ron White. Tech. Media

5. How the Internet Work 2000 by PrestonGralla Tech. Media.
6. Statistical Methods in Biology - 2000 by Bailey, N.T. J. English Univ. Press.
7. Biostatistics - 7th Edition by Daniel
8. Fundamental of Biostatistics by Khan
9. Biostatistical Methods by Lachin