C. U. SHAH UNIVERSITY

FACULTY OF SCIENCES

DEPARTMENT OF LIFE SCIENCES

COURSE: Masters of Science **SEMESTER: IV**

SUBJECT NAME: Biostatistics and Bioinformatics

SUBJECT CODE: 5SC04BIBI

Teaching & Evaluation Scheme:-

Teaching hours/week				Credit	Evaluation Scheme/semester							
					Theory				Practical			Total Marks
Th	Tu	Pr	Total		Sessional Exam		University Exam		Internal		University	
					Marks	Hrs	Marks	Hrs	Pr	TW		
4	0	0	4	4	30	1	70	3	-	-	-	100

Objectives:- The objective of this course is that the students can learn about basics and details of Biostatistics and Bioinformatics.

Prerequisites:- Basic knowledge of Biological Sciences and Research Methodology.

Course outline:-

Sr. No.	Course Contents	Hours
1	**Principles and practice of statistical methods in biological research** Samples and Populations; Probability distributions- addition and multiplication theorems, Baye's theorem, Binomial, Poisson, and Normal distribution; Data presentation- Types of data, Methods of data representation.	12
2	**Measures of central tendency**- Mean, Median, Mode; **Measures of dispersion**- Range, Mean deviation and Coefficient of variation, Standard deviation, Standard error; Correlation and regression; Statistical inference- Hypothesis testing, Significance level, Test of significance for large and small samples; Parametric tests; Non parametric tests; Experimental design, Use of biostatistic softwares.	10
3	**Bioinformatics basics** Application and research; Present global bioinformatics scenario. Databases- characteristic of bioinformatics databases, navigating databases, information retrieval system and database collaboration; Sequence databases- nucleotide sequence databases, protein sequence database, information retrieval system e.g. Entrez and SRS; Structure databases- Structure file format, Protein structure database collaboration, PDB, MMDB, FSSP, SCOP, BRENDA, AMENDA and FRENDA, Pathway databases e.g. CAZy.	08
4	**Tools**- Need for tools, data mining tools, data submission tools e.g. nucleotide submission tools and protein sequence submission tools; **Data analysis tools**- nucleotide sequence analysis and protein sequence analysis tools e.g. BLAST & FASTA. **Prediction tools**- multiple nucleotide alignment, phylogenetic tree, gene prediction, protein structure & function prediction. Modeling tools: 2D and 3D protein modeling.	12

Learning Outcomes:- The students are expected to

- Handeling the software of various types of sequencing methods.
- Measurement of statistical data.

Books Recommended:-

1 **Casella G.** and **Berger R.L.**, Statistical Inference (The Wadsworth and Brooks/Cole Statistics/Probability Series) b, Brooks/Cole Pub Company.

2 **Grant G.R., Ewens W.J.** ,Statistical Methods in Bioinformatics: An Introduction. Springer Verlag.

3 **Jagota A.** Data Analysis and Classification for Bioinformatics, Bioinformatics By The Bay Press.

FACULTY OF SCIENCES

DEPARTMENT OF LIFE SCIENCES

COURSE: Masters of Science **SEMESTER: IV**

SUBJECT CODE: 5SC04VIR1 **SUBJECT NAME: Virology**

Teaching & Evaluation Scheme:-

Teaching hours/week				Credit	Evaluation Scheme/semester							
					Theory				Practical			Total Marks
Th	Tu	Pr	Total		Sessional Exam		University Exam		Internal		University	
					Marks	Hrs	Marks	Hrs	Pr	TW		
4	0	0	4	4	30	1	70	3	-	-	-	100

Objectives:- The objective of this course is that the students can learn about basics and details study of Virology.

Prerequisites:- Basic knowledge of Medical Microbiology including viral infection studies.

Course outline:-

Sr. No.	Course Contents	Hours
1	**Brief outline on discovery of viruses**, nomenclature and classification of viruses; **Viral genome**, their types and structures; virus related agents; Viral cultivation, assay and diagnosis; primary & secondary cell cultures; Assay of viruses, physical and chemical methods (protein, nucleic acid, radioactivity tracers, electron microscopy), **Infectivity assay** (plaque method, end point method) – Infectivity assay of plant viruses. Haemagglutination & HAI; complement fixation; immunofluorescence methods, ELISA and Radioimmunoassays.	12
2	**Bacterial Viruses**- Classification and nomenclature, Bacteriophage structural organization; **Life cycle**: lytic and lysogenic cycle, application of bacteriophages; brief details on M13,T3,T4, and Lamda.	10
3	**Plant Viruses**- Classification and nomenclature; Structure and life cycle of plant viruses. Propagation, purification, characterization, identification and genomics of plant viruses like TMV, Cauliflower Mosaic Virus, Transmission of plant viruses, Viral diseases and their control. Some common viral diseases of plants. **Viral and Viriod diseases**: Papaya ring spot, tomato yellow leaf curl, Potato spindle tuber.	08
4	**Animal Viruses**- Classification and nomenclature; Structure and lifecycle of animal viruses. Replicative strategies employed by DNA and RNA viruses. Epidemiology, pathogenicity, diagnosis, prevention and treatment of Rota, Pox, Herpes, Adeno, Hepatitis, HIV and other Oncogenic viruses; viral vaccines (conventional vaccines, genetic recombinant vaccines used in national immunisation programmes with examples, DNA Vaccines with examples interferons, and antiviral drugs.	12

Learning Outcomes:- The students are expected to

- Identification of various kind of virus infected diseases and treatment related information.

Books Recommended:-

1. **Morag C and Timbury M.C (1994)** Medical virology-X Edition. Churchill Livingstone, London.
2. **Dimmock NJ, Primrose SB (1994).** Introduction to Modern Virology, IV Edition, Blackwell Scientific Publications, Oxford
3. **Conrat HF, Kimball PC and Levy JA (1994)** Virology-Ill Edition Prentice Hall, Englewood cliff, New Jersey.
4. **Mathews, RE.,(1992)** Functionals of Plant virology, Academic press, San Diego.

FACULTY OF SCIENCES

DEPARTMENT OF LIFE SCIENCES

COURSE: Masters of Science **SEMESTER: IV**

SUBJECT NAME: Microbiology Dissertation

SUBJECT CODE: 5SC04MBD1

Teaching & Evaluation Scheme:-

Teaching hours/week				Credit	Evaluation Scheme/semester							
					Theory				Practical			
Th	Tu	Pr	Total		Sessional Exam		University Exam		Internal		University	Total Marks
					Marks	Hrs	Marks	Hrs	Pr	TW		
0	0	0	20	20	0	0	0	0	150	-	350	500

Note: The Dissertation will be based upon research and actual bench work. It will be carried out in IV Semester, but may be started in the III Semester. The dissertation will be submitted at the end of semester. Dissertation report and work will be evaluated by external and internal examiners.