SYLLABUS

MANONMANIAM SUNDARANAR UNIVERISTY, TIRUNELVELI-12

UG - COURSES – AFFILIATED COLLEGES

Course Structure for **B.Sc. Zoology**

(Choice Based Credit System)

(with effect from the academic year 2017- 2018 onwards)

Semester-VI				
Part	Subject Status	Subject Title	Subject Code	Credit
III	Core	EVOLUTION	SMZO61	4
	Core	IMMUNOLOGY AND MICROBIOLOGY	SMZO62	4
	Elective	BIOSTATISTICS, COMPUTER APPLICATIONS & BIOINFORMATICS	SMZO63	4
	Elective	MAJOR PRACTICAL-VIII	SMZOP8	4
	Common	MAJOR PRACTICAL-IX	SMZOP9	2
	Practical	MAJOR PRACTICAL -X	SMZOPA	4
	Practical	PROJECT	SMZO6P	4

Total Marks: 100 Internal Exam: 25 marks + External Exam: 75 marks

A. **Scheme for internal Assessment**:
Maximum marks for written test: **20 marks**
3 internal tests, each of **I hour** duration shall be conducted every semester.
To the average of the **best two** written examinations must be added the marks scored in. The **assignment** for 5 marks.

The break up for internal assessment shall be:
Written test- 20 marks; Assignment -5 marks Total - 25 marks

B. Scheme of External Examination
3 hrs. examination at the end of the semester
A – Part : 1 mark question two - from each unit
B – Part : 5 marks question one - from each unit
C – Part : 8 marks question one - from each unit

- **Conversion of Marks into Grade Points and Letter Grades**

S.No	Marks	Letter Grade	Grade point (GP)	Performance
1	90-100	O	10	Outstanding
2	80-89	A+	9	Excellent
3	70-79	A	8	Very Good
4	60-69	B+	7	Good
5	50-59	B	6	Above Average
6	40-49	C	5	Pass
7	0-39	RA	-	Reappear
8	0	AA	-	Absent

- **Cumulative Grade Point Average (CGPA)**

$$\mathbf{CGPA} = \frac{\mathbf{\Sigma\,(GP \times C)}}{\mathbf{\Sigma C}}$$

- **GP** = Grade point, **C** = Credit
- CGPA is calculated only for Part-III courses
- CGPA for a semester is awarded on cumulative basis

- **Classification**
  a) First Class with Distinction : CGPA $\geq$ 7.5*****
  b) First Class : CGPA $\geq$ 6.0
  c) Second Class : CGPA $\geq$ 5.0 and $<$ 6.0
  d) Third Class : CGPA $<$ 5.0

EVOLUTION

OBJECTIVES

To know how the life originated in our planet and related theories

OUTCOME

Students learned relationships between abiotic and biotic factors

UNIT I

ORIGIN OF LIFE

Chemical origin of life – Biological experimental evidences. Evidences in favour of evolution : -Homologous organs and Analogous structures. -Embryological evidences – palaeontology - geologicalscale – biochemistry and physiology.

UNIT II

Lamarckism and Neo – Lamarckism Darwinism and Neo – darwinism. Mutation theory of De vries Modern concept of evolution : Natural selection – types and mechanism.

UNIT III :

Variations and Sources of Variability. Isolation and Isolating mechanisms. Population genetics and evolution :

- Hardy – weinberg law
- Species concept and speciation – types and mechanism.

UNIT IV:

Mimicry and Protective Colouration . Adaptations : Cursorial , Fossorial , Arboreal, Volant , Aquatic , Desert , Cave.

UNIT V :

Evolution of Horse. Evolution of man- Ancestry of man-Salient features of Apes and Man- Trends in Human Evolution – Causes for Human Evolution- Evolution of man as seen in the fossil record. Cultural Evolution of Man. Animal distribution (Geographical) – Patterns of Distribution - Zoogeography of Palaearctic , Nearctic , Neotropical , Ethiopian , Oriental and Australian region.

PRACTICALS:

1. Museum specimens, slides, models and charts.
2. Animals of evolutionary significance: Peripatus, Archeopteryx, Limulus.
3. Colouration: Mimicry- Lycodon and Krait; Mutation-Peppered Moth, Ancon sheep, Stick insect, Leaf insect

4. Variations : variation and finger prints
5. Gene Frequency : Hardy Weinberg law- probability Experiment.

REFERENCE BOOKS

1. Organic Evolution- N. Arumugam
2. Evolution- M. P. Arora
3. Moody, Introduction To Evolution.
4. Dobzhansky, Th.: Genetics And The Origin Of Species 1951,Columbia Uty. Press.
5. Dodson, Evolution – Process and Product.

IMMUNOLOGY AND MICROBIOLOGY

OBJECTIVES:

To study the immune system and their role of our body.

OUTCOME:

To know the life cycle of microbes and their control measures.

UNIT I

History and Scope of Immunology. Immunity-Type of Immunity - Innate & acquired, passive & active. Lymphoid organs –primary & secondary (Thymus, Bone marrow, Bursa of fabricius , Spleen, Tonsil, Lymph node, Peyer‟s patches) – Structure and Functions.

UNIT II

Immunoglobulin-Structure, Function, Biological properties of Ig classes. Interaction of Antigen and antibody. Salient features of antigen- antibody reaction. Types of antigen-antibody reaction – Agglutination, Precipitation, Opsonization, Cytolysis.

UNIT III

Immune response-Lymphocyte as unit of immune system, stem cells - Structure and lineage, T cells, B cells & Macrophages. Humoral immune response - primary & secondary responses - B cell activation. Cell - Mediated immune response - Type of T cells & functions. Tumour immunology.

UNIT IV

Introduction : History & Scope of microbiology. General structure of microbes (Bacteria, virus). Bacterial growth : Culture media & selective media; Continuous & batch culture techniques, growth curve.

UNIT V

Food microbiology :Food poisoning ; Food spoilage & preservation. Industrial microbiology : production of Antibiotic penicillin. Soil microbiology : Role of soil microbes in N2 fixation. Medical microbiology : Diseases caused by bacteria in different systems of man as given below**:** Dermal – Streptococcal inflammation : - Tuberculosis; Gastro-intestinal-dysentery**:**Reproductive – Gonorrhea. Viral diseases with reference to causative organisms, symptoms, impact on the host & control measures, AIDS , Rabies, Chicken pox, Measles, Influenza & polio.

PRACTICALS:

I .IMMUNOLOGY:

ABO blood grouping and Rh blood grouping. 2.Lymphoid organs in Rat(monstration only)

Spotters:

Charts, slides and figures: Stem cells, Phagocytes, Thymus, Bone marrow, Spleen, Lymph node, Immunoglobulin.

II.MICROBIOLOGY:

1. Simple staining ofbacteria.
2. Gram-Staining of bacteria.
3. Serial dilutiontechniques.
4. Microscopic examination of living bacteria - hanging dropmethod.
5. Microscopic counting of microbes using haemocytometer (Demonstration only)
6. Measurement of microbes using ocular & stage micrometers (Demonstrationonly)
7. Preparation of culture media formicrobes.
8. Distribution of microorganisms in nature-soil, water, &air.
9. Aseptic transfer of microbes & pure culture of bacteria and cultural characteristicsof Micro-organisms.

Spotters:

Charts, slides and figures-Autoclave, Hot air oven, Agar plate, Agar stab, Agar slant, Inoculation needle.

REFERENCE BOOKS:

IMMUNOLOGY

1. Roitt, I. : Essential Immunology(ELBS).
2. Kuby : Immunology(W.H.Freeman)

MICROBIOLOGY

1. Pelczar, Reid & Chan:Microbiology.
2. Philip, L. Carpenter :Microbiology.
3. Powar : GeneralMicrobiology.
4. Salle,A.J: Fundamental Principles ofBacteriology.
5. Alexander, M : Introduction to SoilMicrobiology.
6. Frazier,A.C. & Westhoff,D.C: FoodMicrobiology.
7. Burrows : Text Book ofMicrobiology.
8. Lakshmanan,M : Laboratory manual inMicrobiology.

9. Moat & Foster : MicrobialPhysiology.
10. Rangaswami,G : Diseases of crop plants inIndia.
11. Patel,A.H.:Industrial Microbiology (MC . MillanIndia).

BIO STATISTICS, COMPUTER APPLICATIONS AND BIOINFORMATICS

OBJECTIVES.

To study the descriptive and non descriptive methods of mathematics and their application in biology incorporating computer systems.

OUTCOME.

To understand the mathematical principles of biological systems. And bioinformatics

UNIT I

Definition and scope; Data – Types & collection; Sampling methods – Variables – Discrete and continuous; Presentation of Data , Classification and Tabulation ; Parts of table. Diagrams and Graphs: Line diagrams, Bar Diagram, Pie diagrams, Histogram, Frequency polygon, Frequency poly curve. Measures of Central Tendency – Calculation of Mean, Mode and Median (Grouped and Ungrouped Data)

UNIT II

Measures of dispersion: Variance , Range , Standard Deviation and standard Error, Coefficient of variation. Chi – square test – Calculation and application, students„t‟ Test. Correlation: Introduction , Types , Perfect positive and negative, Linear and Non-Linear methods Scatter diagram, Karl Pearson‟s correlation coefficient ; Interpretation of the Correlation coefficient.

UNIT III

Introduction to computer, Generation of computer – Components of computer, Input devices and Output devices – CPU – Primary and Secondary Memory operating system. Introduction to M.S. Office software, covering, word processing, spread sheet and presentation software. MS Word basics : Creating word document – File, edit, Format, Save menus, adding bullets, numbering and symbols – printing. MS Excel – entering and editing cell entries – adjusting row and column height – Pie-bar-line chart preparation. Uses of Internet – Email, Internet Browsing, World Wide Web(WWW), M.S Power point.

UNIT IV

Bioinformatics : Introduction – Definition of Bioinformatics – History – Importance of Bioinformatics – Scope and application of Bioinformatics – Components of Bioinformatics - Bioinformatics in life science. Biological sequence analysis – Sequence alignment – Pair wise sequence comparison – multiple sequence alignment.

UNIT V

Major Data bases in Bioinformatics – Nucleic acid sequence databases – EMBL – Genbank – Protein sequence database – SWISS – PROT . Databases similarity search Tools: BLAST FASTA – Application of bioinformatics tools. Database Retrieval Tools: ENTREZ – Locus link – Pub Med (Publishers on Medicine) SRS . Protein structure visualizing tools – RasMol, Swiss PDB viewer.

PRACTICALS:

1. Find out Mean, Median, Mode, Standard deviation, Standard error and co-efficient of variance using Neemleaf.
2. Calculation ofcorrelation.
3. Bar diagram, Histogram, Pie diagram and frequencycurve.
4. Models, Chart and Photos: Computer Mouse, CPU, Keyboard,Monitor.
5. Visit to a Computer centre to learn internet browsing and email sending – Compulsory for eachstudent.
6. Take printout from NCBI, EMBL and PubMed and keep it forspotters.
7. Write some of the file commands and keep forspotters.

REFERENCE BOOKS:

BIO STATISTICS

1. Arora and Mathan. Bio Statistics (5th Edition). Himalaya Publishing House, Ramdoot, Dr.Bhalerao Marg,Girgaon,Mumbai – 400004.
2. Daha, T.K. Biostatitics in Theory and Practics. EMKAY Publications, Post Box No.9410, B-19, East Akrishna Nagar, Swami Dayanand Marg, Delhi-110051.
3. Gurumani. N, An Introduction to Biostatistics (computer Application included) 2nd Edition M.J.P. Publishers, Tamilnadu Book House, 47 Nallathambi street,Triplicane- 600 005.
4. Jasra, P.K. and Gurdeef Raj. Biostatistics, Krishna Prakashan Media(P) Limited, 11, Shivahi Road, Meerut – 250001
5. Parihar and Parihar. Biostatistics and biometry, Student Edition, Agrobios(India) Behind Nasrani Cinema,Chopasani Road,Hodhpur-342002.
6. Pranab Kumar Banergee. Introduction to Biostatistics (2nd Edition). S. chand & Company Limited, 7361, Ram nager,New Delhi-110055
7. Prasad, S. Elementa of Biostatistics. Rastogi Publications, Gangotri, ShivajiRoad, Meerut 250002.

8. Satguru Prasad – Fundamentals of Biostatistics (Biometry). EMKAY Publication,Post Box No.9410 B-19, East Akrishna Nagar, Swami Dayanand Marg, Delhi-110051.
9. Pagano, M. and K. Gauvreau. Principles of Biostatistics. Thomas Learning,Alps Building,1st floor,56,Janpath,NewDelhi.
10. Satgurau Prasad, Elements of Biostatistics, Rastogi Publications Gangotri,Shivaji Road, Meerut 250002.

COMPUTER APPLICATIONS:

- Krishnamoorthy, R. Computer Programming andapplications.
- Rajaram, V. Fundamentals of computers.

BIOINFORMATICS:

1. Bal, H.P. Bioinformatics principles and Applications, Tata Mc Graw Hill Publishing company Limited, No. 444/1 Sri Ekambara Naicker Industrial Estate, Alkapakkam, Porur, Chennai – 600116
2. Dan, E. Krane and Michael L. Raymer.Fundamental concepts of Bioinformatics. Pearson Education (Singapore) PTE Limited, Indian Branch, 482 FIE Patparganj,Delhi-110 092.
3. Ignacimuthu, S. Basic Bioinformatics. Narosa Publishing House Private Limited,35- 36 Greams Road, Thousand Lights, Chennai-600006
4. Ranga, M.M. Bioinformatics, Agrobios (India) Behind Nasrani cinema,Chopasani Road, Hodhpur – 342002.
5. C.S.V. Murthy Bioinformatics- Himalaya PublishingHouse.