BAGALKOT UNIVERSITY

Mudhol Road, Jamkhandi – 587301 Dist: Bagalkote

PROGRAM /COURSE STRUCTURE AND SYLLABUS
of

Zoology

IV Semester

BACHELOR OF SCIENCE (ZOOLOGY)

As Per NEP – 2020 and Adapted from RCU Belagavi Applicable from the Academic Year 2024-25

SEMESTER-IV										
Category	**Course code**	**Title of the Paper**	**Marks**			**Teaching hours/week**			**Credit**	**Duration of exams (Hrs)**
			IA	**SEE**	**Total**	**L**	**T**	**P**		
L7		Kannada	40	60	100	4	-	-	3	2
		Functional Kannada								
L8		English	40	60	100	4	-	-	3	2
		Hindi								
		Sanskrit								
		Arabic								
		Urdu								
DSC4	126BSC04ZOODSC07T	Gene Technology, Immunology and Computational Biology	40	60	100	4	-	-	4	2
	126BSC04ZOODSC08L	Gene Technology, Immunology and Computational Biology	25	25	50	-	-	4	2	4
DSC4	Another Department Code	Another Department Course Title	40	60	100	4	-	-	4	3
			25	25	50	-	-	4	2	3
SEC	126COM03XXXSEC03T	Artificial Intelligence	20	30	50	1	-	2	2	2
VBC7	126COM04XXXVBC08B	Yoga/ Sports	25	-	25	-	-	2	1	-
VBC8	126COM04XXXVBC09B	H&W, /NCC/NSS/R&R/CA	25	-	25	-	-	2	1	-
			Total Marks		**600**	**Semester Credits**			**22**	

Concept Note, Abbreviation Explanation and Coding:

Concept Note:

1. **CBCS** is a mode of learning in higher education which facilitates a student to have some freedom in selecting his/her own choices, across various disciplines for completing a UG/PG program.
2. A credit is a unit of study of a fixed duration. For the purpose of computation of workload as per UGC norms the following is mechanism be adopted in the University: One credit (01) = One Theory Lecture (L) period of one (1) hour.One credit (01) = One Tutorial (T) period of one (1) hour. One credit (01) = One practical (P) period of two (2) hours.
3. Course: paper/subject associated with AECC, DSC, DSEC, SEC, VBC, OEC, VC, IC and MIL
4. In case of B.Sc. Once a candidate chose two courses/subjects of a particular two department in the beginning, he/she shall continue the same till the end of the degree, and then there is no provision to change the course(s) and Department(s).
5. A candidate shall choose one of the Department‘s courses as major and other Department course as minor in fifth and sixth semester and major course will get continued in higher semester.
6. Wherever there is a practical there will be no tutorial and vice-versa
7. A major subject is the subject that's the main focus of Core degree/concerned.
8. A minor is a secondary choice of subject that complements core major/concerned.
9. Vocational course is a course that enables individual to acquire skills set that are required for a particular job.
10. Internship is a designated activity that carries some credits involving more than **25days** of working in an organization (either in same organization or outside) under the guidance of an identified mentor. Internship shall be an integral part of the curriculum.
11. **OEC: For non computer science students. Computer Science students have to opt for OEC from departments other than major and minor disciplines. Abbreviation Explanations:**

1. AECC: Ability Enhancement Compulsory Course.
2. DSC: Discipline Specific Core Course.
3. DSEC: Discipline Specific Elective Course.
4. SEC: Skill Enhancement Course.
5. VBC: Value Based Course.
6. OEC: Open/Generic Elective Course
7. VC: Vocational Course.
8. IC: Internship Course
9. L1: Language One
10. L2: MIL
11. L= Lecture; T=Tutorial; P=Practical.
12. MIL=Modern Indian Language; English or Hindi or Telugu or Sanskrit or Urdu

Program Coding:

1. Code21:Year of Implementation
2. Code BSc: BSc Program under the faculty of Applied Science of the University
3. Code1: First Semester of the Program, (2 to 6 represent higher semesters)
4. CodeAE: AECC,(C for DSC,S for SEC,V for VBC and O for OEC)
5. Code1:First—AECC‖Course in semester, similarly in remaining semester for such other courses
6. Code LK: Language Kannada, similarly Language English, Language Hindi, Language Telugu, Language Sanskrit, & Language Urdu
7. Code1: Course in that semester.
8. Zoo: Zoology

Note: *All skill enhancement course (SEC) syllabus and title should be selected time to time notice from the university and/or NEP committee accordingly.*

ASSESSMENT METHODS

Evaluation Scheme for Internal Assessment:

Theory:

Assessment Criteria	**40marks**
1st Internal Assessment Test for 30 marks 1 hr after 8 weeks and 2nd Internal Assessment Test for 30 marks 1hr after15 weeks. Average of two tests Should be considered.	30
Assignment 1	05
Assignment 2/Attendance	05
Total	**40**

Practical:

Assessment Criteria	**25 marks**
Internal Assessment Test	15
Journal & Attendance>75%	10
Total	**25**

IV Semester, B.Sc, (Hons) Zoology

Course Title: **Gene Technology Immunology and Computational Biology**	Course Code: **126BSC04ZOODSC07T**
Course Type: **Discipline Core Theory, L-T-P: 4-0-0**	Course Credits: **4**
Total Contact Hours: **56**	Duration of ESA: **2Hrs.**
Formative Assessment Marks:**40**	Summative Assessment Marks:**60**

At the end of the course the student should be able to:

1. Acquaint knowledge on versatile tools and techniques employed in genetic engineering and recombinant DNA technology.
2. An understanding on application of genetic engineering techniques in basic and applied experimental biology.
3. To acquire a fundamental working knowledge of the basic principles of immunology.
4. To understand how these principles, apply to the process of immune function.
5. Use, and interpret results of, the principal methods of statistical inference and design; helps to communicate the results of statistical analyses accurately and effectively; helps in usage of appropriate tool of statistical software.

Course Content	Hrs.
Unit I	**14**
Chapter 1: Principles of Gene Manipulation ● Recombinant DNA Technology: Introduction, steps involved. ● Restriction Enzymes and Ligases and Nucleic acid modifying enzyme. ● Gene cloning Vector: Concept of plasmids-pBR322, Lamdaphage vectors, cosmids ● Gene transfer techniques (Direct and indirect). ● Screening and selection of recombinant colonies	07
Chapter 2:Applications of Genetic Engineering Transgenic animals (Transgenic cow, Transgenic Fish); Transgenic plants (cryprotein); Gene silencing (Knockout and Knock in mouse). ● Production of Human Recombinant insulin and ● Hybridoma technology: Synthesis and applications of Monoclonal antibodies ● Gene Therapy (SCID) ● Biosensors and its applications	07
Unit II	**14**

Chapter3:IntroductiontotheImmuneSystem • Defense against diseases: Introduction, First and second line of defense, Innate and acquired immunity; Antigen presenting cells (APC's), Role of Band T-lymphocytes (humoral immunity and cell mediated immunity), primary and secondary immune response. • Types of immunity • Functional aspects of organs of the Immune system-Thymus and bone Marrow, spleen, Lymph Node, Small intestine and Liver (Peyer's patches and Von Kupffer cells).	07 07
Chapter 4: Antigens and Antibodies • Antigens and haptens: Properties (foreignness, molecular size, heterogeneity). ● Band T cellepitopes. ● Structure of Ig Gandfunctions of different classes of immune globulins. ● Major histo compatibility complex –Structure of MHCI&II.	
Unit III	**14**
Chapter5: Clinical Immunology ● Immunity against diseases of viral, bacterial and protozoan infections. ● Vaccines: Types and Uses-Immunization schedule for children. ● Transplantation immunology: Transplantation of organ- Types, graft rejection and Immuno-suppressors.	07
Chapter6:Bioinformatics • Databases:Sequence and structural • Sequence analysis (homology):Pair wise and Multiple Sequence alignment-BLAST, CLUSTALW, Sequence alignment-FASTA. • Scope and applications of Bioinformatics.	07
Unit-IV	**14**
Chapter7:BiostatisticsI • Measures of central tendency: Mean, Median, Mode. ● Data summarizing: Frequency distribution, Graphical presentation - bar diagram, pie diagram, histogram. ● Elementary idea of probability and its applications.	07
Chapter8:BiostatisticsII • Measures of dispersion: Range, Standard Deviation, Variance. ● Correlation and Regression. ● Tests of significance-test,ANOVA,t-test and Chisquare test.	07

Topics Suggested for Assignment/Formative Assessment:

1. Q/A, Short Question, Quiz, MCQ, Assignment etc.

Recommended Books:

1. Primrose & Twyman.Principles of Genome Analysis and Genomics. Blackwell (2003).
2. Hartl&Jones.Genetics: principles&AnalsysisofGenes&Genomes.Jones&Bartlett (1998).

3. Sambrook*etal*.Molecular Cloning Vols I, II, III.CSHL (2001).
4. Primrose.Molecular Biotechnology.Panima (2001). 5. Clark & Switzer.Experimental Biochemistry.Freeman (2000)
6. Sudbery.Human Molecular Genetics. Prentice-Hall (2002).
7. Wilson.ClinicalGenetics-AShort Course, Wiley (2000).
8. Pasternak. An Introduction to Molecular Human Genetics.Fritzgerald (2000).
9. Biostatistical Analysis (Fourth Edition) by Jerrold H.Zarr,Pearson Education Inc.,Delhi.
10. Statistical Methods (Eighth Edition) by G. W. Snecdecor and W.G. Cochran, Willey Blackwell
11. Biostatistics (Tenth Edition) by W.W.Danieland C. L.Cross,Wiley
12. Introductory Biological Statistics (Fourth Edition) by John E. Havel, Raymond E.Hampton and Scott J.Meiners
13. Westheadetal Bioinformatics:InstantNotes.VivaBooks (2003)
14. Genetic engineering:Sandhya Mitra BITS,Pilani
15. Principles of Biostatistics Khan and Khan am
16. Transgenic animals:Ranga

Semester: IV

Course Lab Content

Course Title: **Gene Technology, Immunology and Computational Biology**	CourseCredits:**02**
Course Type: **Minor Discipline Core Practical, L-T-P:0-0-4**	Course Code: 126BSC04ZOODSC08L
Total Contact Hours: **56**	DurationofESA:4**Hours**
Formative Assessment Marks:**25**	Summative Assessment Marks: **25**

Course Outcomes (COs):

At the end of the course the student should be able to:

1. Accurately, safely and appropriately use all the equipment regularly used in Molecular Biology (DNA manipulation, including balances, pipettes, electrophoresis and centrifuges).
2. Prepare chemical solution and reagents to the precision appropriate to the task. Demonstrate knowledge of the biochemical basis underpinning the molecular biology techniques.
3.

Lab IV Course Content

List of labs to be conducted	Hours 56
1. Calculate the mean, median, mode and standard deviation (Measurement of pre and post clitellar lengths (with suitable examples).	2
2. Measure the height and weight of all students in the class and apply statistical measures.	2
3. Determination of ABO Blood group and Rh factor.	1
4. To study Restriction enzyme digestion using teaching kits (Demonstration only).	1
5. To detect genetic mutations by Polymerase Chain Reaction (PCR) using teaching kits (Demonstration only).	2
6. Demonstration of agarose gel electrophoresis for detection of DNA.	2
7. Demonstration of Polyacrylamide Gel Electrophoresis (PAGE) for detection of proteins.	1
8. To calculate molecular weight of unknown DNA and protein fragments from gel pictures.(https://youtube/mCiCiO0cfbg)	1
9. To learn nucleotide sequence database.	1
10. To learn sequence alignment: Pairwise alignment (Protein/DNA).	1
	1