



**Syllabus for
B.Sc. ZOOLOGY (UG)
I & II SEMESTERS**

Framed According to the National Educational Policy (NEP 2020)

To implement from the academic year 2021-22

BANGALORE UNIVERSITY

Proceedings of the meeting of BOS (UG) in Zoology

Reference:

1. G.O. ED: 260/USE/2019 (part-1), Bangalore dated 15.09.2021
2. Email from HEC, GOK dated 15.09.2021
3. University order dated 17.09.2021
4. Meeting with Prof. B. Timmegowda, Vice-chairman, HEC, GOK on 28.10.2021

Adverting to above, the drafted syllabus prepared by Higher Educational Council (HEC), Government of Karnataka (GOK) pertaining to B. Sc Zoology was circulated by online mode to all the members of BOS, for scrutiny and approval.

Several discussions were held on following dates: 17th, 19th, 21st September 2021 and also on 28th October 2021 to reach final consensus on final syllabus.

Agenda: Approval of syllabus for BSc in Zoology theory and Practical and Scheme of examination for I and II semesters of Bangalore University, Bangalore.

Resolution: The proposed syllabus for BSc in Zoology theory and Practical and Scheme of examination for I and II semesters were scrutinized thoroughly, finalised with appropriate inclusion(s) and deletion(s) of content(s) and finally approved.

Members Participated (online)

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| 1. Dr. P. Mahaboob Basha, Professor, Dept of Zoology, Bangalore University, Bangalore. | Chairman |
| 2. Dr. Asiya Nuzhath F.B, Asso. Professor of Zoology, Tumkur University, Tumkur- 572101. | Member |
| 3. Dr. Vijaya Kumar, Asso. Professor of Zoology, Kuvempu University, Shankaraghatta- 577115. | Member |
| 4. Dr. Sitavi Yathiender, Asso. Professor of Zoology, Jyoti Nivas College, Bangalore- 560095. | Member |
| 5. Dr. Abhinandini I. David, Asso. Professor of Zoology, GFGC, Channapattana-562160. | Member |
| 6. Dr. Bhushanam M, Asso. Professor of Zoology, Maharanis Science College for Women, Bangalore. | Member |
| 7. Mrs. Anthuvan Grace, Asst. Professor of Zoology Bishop Cotton Women's College, Bengaluru- | Member |
| 8. Mr. Ramesh PL, Asso. Professor of Zoology, National College, Basavangudi, Bangalore- 560004. | Member |
| 9. Mr. Dharmendra, Asst. Professor of Zoology, Nalini Raghunath Rao College, Jigani, Bangalore. | Member |

The meeting concluded with the chairman thanking all members for their cooperation.

The members have sent their consent (approval) through their ID mails the same is recorded and exact of the proceedings prepared for dispatch to academic bodies of University for approval and implementation.

Date: 28.10.2021



(MAHABOOB BASHA)

CHAIRMAN BOS (UG)
B. Sc in Zoology

Syllabus for B.Sc., Hons in Zoology

Name of the Degree Program: **B. Sc., Hons**
Discipline Core: **Zoology**
Total Credits for the Program: **50/100/142/184/268**
Starting year of implementation: **2021-22**

Progressive Certificate, Diploma, Bachelor Degree or Bachelor Degree with Honours Provided at the End of Each Year of Exit of the Four-year Undergraduate Programme/ Five-year Integrated Master's Degree Programme

Introduction

The NEP-2020 offers an opportunity to effect paradigm shift from a teacher-centric to student-centric higher education system in India. It caters skill based education where the graduate attributes are first kept in mind to reverse-design the programs courses and supplementary activities to attain the graduate attributes and learning attributes. The learning outcomes-based curriculum framework for a degree in B.Sc. (Honours) Zoology is intended to provide a comprehensive foundation to the subject and to help students develop the ability to successfully continue with further studies and research in the subject while they are equipped with required skills at various stages. Effort has been made to integrate use of recent technology and use of MOOCs to assist teaching-learning process among students. The framework is designed to equip students with valuable cognitive abilities and skills so that they are successful in meeting diverse needs of professional careers in a developing and knowledge-based society. The curriculum framework takes into account the need to maintain globally competitive standards of achievement in terms of the knowledge and skills in Zoology and allied courses, as well develop scientific orientation, spirit of enquiry problem solving skills and human and professional values which foster rational and critical thinking in the students. This course serves as plethora of opportunities in different fields right from classical to applied Zoology.

GRADUATE ATTRIBUTES IN B.Sc. (Hons.) ZOOLOGY

Some of the characteristic attributes a graduate in Zoology should possess are:

- Disciplinary knowledge and skills:
- Skilled communication:
- Critical thinking and problem solving capacity:
- Logical thinking and reasoning:
- Team Spirit & Leadership Quality:
- Digital efficiency:
- Ethical awareness / reasoning:
- National and international perspective:
- Lifelong learning

Flexibility

- The programmes are flexible enough to allow liberty to students in designing them according to their requirements. Students may choose a single Major, one Major or two Majors during third year (5th semester onwards). Teacher Education or Vocational courses may be chosen in place of Minor/s. Below listed are the various options students may choose from.
- One discipline, Two Languages, Generic Electives, Ability Enhancement, Skill Development and Vocational courses including Extracurricular Activities.
- One discipline along with Languages, Generic Electives, Ability Enhancement, Skill Development and Vocational courses including Extracurricular Activities.

AIMS AND OBJECTIVES OF UG PROGRAM IN ZOOLOGY

- The Programme offers both classical as well as modern concepts of Zoology in higher education.
- It enables the students to study animal diversity in both local and global environments.
- To make the study of animals more interesting and relevant to human studies more emphasis is given to branches like behavioral biology, evolutionary biology and economic Zoology.
- More of upcoming areas in cell biology, genetics, molecular biology, biochemistry, genetic engineering and bioinformatics have also been included.
- Equal importance is given to practical learning and presentation skills of students.
- The lab courses provide the students necessary skills required for their employability.
- Skill enhancement courses in classical and applied branches of Zoology enhance enterprising skills of students.
- The global practices in terms of academic standards and evaluation strategies.
- Provides opportunity for the mobility of the student both within and across the world.
- The uniform grading system will benefit the students to move across institutions within India to begin with and across countries.
- It will also enable potential employers in assessing the performance of the candidates across the world.

Weightage for assessments

| Type of Course | Formative Assessment / IA Marks | Summative Assessment Marks |
|--|---------------------------------|----------------------------|
| Theory | 40 | 60 |
| Practical | 25 | 25 |
| Projects* | 45 | 105 |
| Experiential Learning (Internships etc.) | | |

*In lieu of the research Project, two additional elective papers/ Internship may be offered

Credit distribution for the course

IIA. Model Program Structures for the Under-Graduate Programs in Universities and Colleges in Karnataka

| Semester | Discipline Core (DSC) (Credits) (L+T+P) | Discipline Elective(DSE) / Open Elective (OE) (Credits) (L+T+P) | Ability Enhancement Compulsory Courses (AECC), Languages (Credits) (L+T+P) | | Skill Enhancement Courses (SEC) | | | Total Credits |
|--|---|---|--|------------------------------|---|---|--|------------------|
| | | | | | Skill based (Credits) (L+T+P) | Value based (Credits) (L+T+P) | | |
| I | Discipline A1-(4+2) Discipline B1-(4+2) | OE-1 (3) | L1-1(3), L2-1(3) (4 hrs. each) | | SEC-1: Digital Fluency (2) (1+0+2) | Physical Education for Health & Wellness fitness(1)(0+0+2)(1) (0+0+2) | | 25 |
| II | Discipline A2- (4+2) Discipline B2- (4+2) | OE-2 (3) | L1-2(3), L2-2(3) (4 hrs. each) | Environmental Studies (2) | | Physical Education - NCC/NSS/R&R(S& | | 25 |
| Exit option with Certificate (50 credits) | | | | | | | | |
| III | Discipline A3- (4+2) Discipline B3- (4+2) | OE-3 (3) | L1-3(3), L2-3(3) (4 hrs. each) | | SEC-2: Artificial Intelligence (2)(1+0+2) | Physical Education- NCC/NSS/R&R(S& | | 25 |
| IV | Discipline A4- (4+2) Discipline B4- (4+2) | OE-4 (3) | L1-4(3), L2-4(3) (4 hrs. each) | Constitution of India (2) | | Physical Education - NCC/NSS/R&R(S& | | 25 |
| Exit option with Diploma in Science (100 credits) OR Choose any one of the core subjects as Major and the other as Minor | | | | | | | | |
| V | Discipline A5-(3+2) Discipline A6-3+2) Discipline B5-(3+2) | Vocational-1 (3) | | | SEC-3: SEC such as Cyber Security (2) (1+0+2) | | | 20 |
| VI | Discipline A7-(3+2) Discipline A8-(3+2) Discipline B6-(3+2) | Vocational-2 (3) Internship (2) | | | SEC-4: Professional Communication (2) | | | 22 |
| Exit option with Bachelor of Science Degree, B. Sc. Degree in Zoology (142 credits) or continue studies with the Major in the third year | | | | | | | | |
| VII | Discipline A9-(3+2) Discipline A10-(3+2) Discipline A11-(3) | Zoology E-1 (3) Zoology E-2 (3) Res. Methodology (3) | | | | | | 22 |
| VIII | Discipline A12-(3+2) Discipline A13-(3) Discipline A14-(3) | Zoology E-3 (3) Research Project (6)* | | | | | | 20 |
| Award of Bachelor of Science Honours Degree, B.Sc.(Hons.) Degree in Zoology (184 credits) | | | | | | | | |

SEMESTER WISE CURRICULUM STRUCTURE OF COURSES

[*Note: As per the BOS decision held on 28th October 2021, Only A1 & A2 are followed as core subjects in Zoology for I and II semesters]

| Semester | Name of the course/credits | What all program outcomes the course addresses (not exceeding 3 /course) | Pre- requisite course(s) | Concurrent course | Pedagogy | Assessment |
|--|--|--|---|--------------------------------------|---|--|
| I Semester A1 Core | Cytology, Genetics and Infectious Diseases (4) | <ol style="list-style-type: none"> The structure and functions of animal cell, cell organelles, cell- cell interactions, process of reproduction leading to new organisms. The principles of inheritance, Mendel's laws and the deviations. Inheritance of chromosomal aberrations in | Student must have studied Biology or equivalent subjects in Class 12. | Lab on Cell Biology and Genetics (2) | Lectures/Videos/ Seminars/Case study/Project/ Group discussion/Problem Solving/Formative Assessment/ Summative | Formative and Summative Assessment/ Evaluation/ Analysis of result/ Application of pedagogy, |
| I Semester B1 Core | Biology of Non-Chordates (4) | <ol style="list-style-type: none"> Learn the systematics and biology of non-chordates through their adaptive features. Study the functional biology of non-chordates through their body organization. Comprehend identification of species and their evolutionary relationships. | Student must have studied Biology or equivalent subjects in Class 12. | Lab on Biology of Non- Chordates (2) | Lectures/Videos/ Seminars/Case study/Project/ Formative Assessment/ Summative | Formative and Summative Assessment/ Evaluation/ Analysis of result/ Application of pedagogy, |
| I Semester OE1 Open Elective course | Economic Zoology (3) | <ol style="list-style-type: none"> Acquaint the knowledge about basic procedure and methodology of integrated animal rearing. Students can start their own business i.e. self- employments. Get employment in different sectors of Applied Zoology | Student must have studied Biology or equivalent subjects in Class 12. | | Lectures/Videos/ Seminars/Case study/Project/ Group discussion/Problem Solving/Formative Assessment/ Summative | Formative and Summative Assessment/ Evaluation/ Analysis of result/ Application of pedagogy, |
| SEC 1 Skill Enhancement course | SEC 1 Digital fluency Vermiculture (2) | | Student must have studied Biology or equivalent subjects in Class 12. | | Lectures/Videos/ Seminars/Case study/Project/ Group discussion/Problem Solving/Formative Assessment/ Summative Assessment | Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy, |

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| 2 Semester A2 | Biochemistry and Physiology (4) | 1. In depth understanding of structure of biomolecules like proteins, lipids and carbohydrates. 2. The thermodynamics of enzyme catalyzed reactions. 3. To know various physiological processes of animals. | Student must have studied Biology or equivalent subjects in Class 12. | A2 Lab on Biochemistry, Physiology and Hematology (2) | Lectures/Videos/ Seminar/Case study/Project/ Formative Assessment/ Summative Assessment | Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy |
| 2 Semester B2 | Biology of Chordates (4) | 1. Learn the systematics and biology of Chordates through their adaptive features. 2. Study the functional biology of Chordates through their body organization. 3. Comprehend identification of Chordate species and their evolutionary relationships. | Student must have studied Biology or equivalent subjects in Class 12. | Lab on Biology of Chordates (2) | Lectures/Videos/ Seminar/Case study/Project/ Formative Assessment/ Summative Assessment | Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy, |
| 2 Semester OE2 Open Elective course | Parasitology(3) | | Student must have studied Biology or equivalent subjects in Class 12. | | Lectures/Videos/ Seminar/Case study/Project/ Formative Assessment/ Summative Assessment | Formative and Summative Assessment/ Evaluation/ Analysis of result/ Application of Heutagogy, |
| 2 Skill Enhanceme nt course | Environmental Studies Sericulture (2) | 1. Sericulture is an agro- based industry which gives economic empowerment to the students. 2. Sericulture may be taken up as a small scale industry by the small farmers and unemployed youth. 3. Get jobs in teaching | Student must have studied Biology or equivalent subjects in Class 12. | | Lectures/Videos/ Seminar/Case study/Project/ Formative Assessment/ Summative Assessment | Formative and Summative Assessment/ Evaluation/ Analysis of result/ Application of Heutagogy, |
| EXIT OPTION WITH CERTIFICATE (50 CREDITS) | | | | | | |

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| 3. A3 Core Course | Molecular Biology Bioinstrumentation & Techniques in Biology (4) | Certificate Course in Zoology | Lab on Molecular Biology, Bioinstrumentation & Techniques in Biology (2) | Lectures/Videos / Seminars/Case study/Project/ Group discussion/ Formative Assessment/ Summative Assessment | Formative and Summative Assessment/ Evaluation/ Analysis of result/ Application of Heutagogy, |
| 3B3 Core Course | Comparative Anatomy and Microanatomy (4) | Certificate Course in Zoology | Lab on Comparative Anatomy and Microanatomy (2) | Lectures/Videos / Seminars/Case study/Project/ Group discussion/Formative Assessment/ Summative Assessment | Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy, |

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| 3OE-3 Open Elective course | Endocrinology (3) | Certificate Course in Zoology | | Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment | Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy, |
| 3 Semester Skill Enhancement course | SEC 3 Artificial Intelligence Apiculture (2) | Certificate Course in Zoology | | Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment | Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy, |
| 4 A4 Core course | Gene Technology, Immunology and Computational Biology (4) | Certificate Course in Zoology | Lab on Genetic Engineering And Counselling (2) | Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to industry/Formative Assessment/ Summative Assessment | Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy, |
| 4 B4 Core Course | Cell Biology and Genetics (4) | Certificate Course in Zoology | Lab on Cell Biology and Genetics (2) | Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to industry/Formative Assessment/ Summative Assessment | Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy, |
| 4 Sem OE 4 Open Elective Course | Animal Behavior (3) | Certificate Course in Zoology | | Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment | Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy, |
| 4 Semester Skill Enhancement course | Constitution of India (2) Poultry | Certificate Course in Zoology | | Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment | Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy, |
| EXIT OPTION WITH DIPLOMA (100 CREDITS) | | | | | |
| 5 A5 Major Core Course | Non-Chordates and Economic Zoology (4) | Diploma in Zoology | Lab on Non-Chordates and Economic Zoology (2) | Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Zoo/Formative Assessment/ Summative Assessment | Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy, |
| 5 A6 Major Core Course | Chordates and Comparative Anatomy (3) | Diploma in Zoology | Lab on Chordates (Virtual Dissection) and Comparative Anatomy (2) | Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Zoo/Formative Assessment/ Summative Assessment | Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy, |
| 5 B5 Minor Core Course | Animal Physiology and Animal Biotechnology (3) | Diploma in Zoology | Lab on Animal Physiology and Animal Biotechnology (2) | Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Zoo/Formative Assessment/ Summative Assessment. | Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy. |
| 5 DSEC1 | Vocational -1 Aquatic Biology (3) | Diploma in Zoology | | Lectures/Videos/ Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment | Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy. |

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| 5 SEC 3 Skill Enhancement course | Cyber Security Integrated Animal Rearing (2) | Diploma in Zoology | | Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment | Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy, |
| 6 A7 Major Core Course | Evolutionary and Developmental Biology (3) | Diploma in Zoology | Lab on Evolutionary and Developmental Biology (2) | Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Institute/Formative Assessment/ Summative Assessment. | Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy. |
| 6 A8 Major Core Course | Environmental Biology, Wildlife management and Conservation (3) | Diploma in Zoology | Lab on Environmental Biology, Wildlife management and | Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Zoo/Formative Assessment/ Summative Assessment | Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy, |
| 6 B6 Minor Core Course | Animal Behavior (3) | Diploma in Zoology | Lab on Animal Behaviour (2) | Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Zoo/Formative Assessment/ Summative Assessment. | Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy. |
| DSEC | Vocational-2 Entomology-3 Internship (2) | Diploma in Zoology | | Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment | Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy, |
| 6 Skill Enhancement Course | SEC 4 Professional Communication Fish Culture (2) | Diploma in Zoology | | Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment | Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy, |
| EXIT OPTION WITH B. Sc. DEGREE (142 CREDITS) | | | | | |
| 7 A9 Major Core Course | Ethology (3) | Degree in Bachelor Of Science in Zoology | Lab on Ethology (2) | Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Zoo/Formative Assessment/ Summative Assessment | Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy, |
| 7 A8 Major Core Course | Evolution and Zoogeography (3) | Degree in Bachelor Of Science in Zoology | Lab on Evolution and Zoogeography (2) | Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Zoo/Formative Assessment/ Summative Assessment | Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy, |
| 7A9 Major Core Course | Genetics and Computational Biology (3) | Degree in Bachelor Of Science in Zoology | Lab on Advanced Genetics and Computational Biology (2) | Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment | Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy, |
| 7 | Research methodology (3) | Degree in Bachelor Of Science in Zoology | | Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to research lab/Formative Assessment/ Summative Assessment | Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy, |

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| 7 DSEC | Zoology E-1 (3) Radiation Biology | Degree in Bachelor Of Science in Zoology | | Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative | Formative and Summative Assessment/ Evaluation/ Analysis of result/ Application of Heutagogy, |
| 7DSEC | Zoo Management Zoology E-2 (3) | Degree in Bachelor Of Science in Zoology | | Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative | Formative and Summative Assessment/ Evaluation/ Analysis of result/ Application of Heutagogy, |
| 8 A12 Major Core Course | Immunology and Stem Cell Biology (3) | Degree in Bachelor Of Science in Zoology | Lab on Immunology and Stem Cell Biology (2) | Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative | Formative and Summative Assessment/ Evaluation/ Analysis of result/ Application of Heutagogy, |
| 8A13 Major Core Course | Advanced Molecular Biology and Biostatistics (3) | Degree in Bachelor Of Science in Zoology | | Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment | Formative and Summative Assessment/ Evaluation/ Analysis of result/ Application of Heutagogy, |
| 8A 14 Major Core Course | Genomics and Proteomics (3) | Degree in Bachelor Of Science in Zoology | | Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative | Formative and Summative Assessment/ Evaluation/ Analysis of result/ Application of Heutagogy, |
| 8 | RESEARCH PROJECT (6) | Degree in Bachelor Of Science in Zoology | | Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment | Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy, |
| 8DSEC1 | <i>Any one of the below 4 choice</i> E-3 Neurosciences (3) | Degree in Bachelor Of Science in Zoology | | Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment | Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy, |
| 8DSEC2 | E-3 Parasitology(3) | Degree in Bachelor Of Science in Zoology | | Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment | Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy, |
| 8DSEC3 | E-3 Animal Experimentation and Ethics(3) | Degree in Bachelor Of Science in Zoology | | Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment | Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy, |
| 8DSEC4 | E-3 Behavioral Biology(3) | Degree in Bachelor Of Science in Zoology | | Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment | Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy, |

| EXIT OPTION WITH B. Sc. HONOURS DEGREE (184 CREDITS) | | | | | |
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| 9 A15 Major Core Course | Animal Biotechnology and Genetic Engineering (3) | Degree in Bachelor of Science Honors | Lab on Animal Biotechnology and Genetic Engineering (2) | Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment | Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy, |
| 9 A 16 Major Core Course | Microanatomy Histochemistry and Histopathology (3) | Degree in Bachelor of Science Honors | Lab on Microanatomy, Histochemistry and Histopathology (2) | Lectures/Videos/ Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment | Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy, |
| 9 A 17 Major Core course | Molecular Endocrinology (3) | Degree in Bachelor of Science Honors | Lab on Molecular Endocrinology (2) | Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Lab/Formative Assessment/ Summative Assessment | Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy, |
| 9 A18. | Research methodology (3) of 7 th sem) Applied Zoology . | Degree in Bachelor of Science Honors. | | Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment. | Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy.. |
| 9DSEC1 | E-1 Animal Biotechnology (3) | Degree in Bachelor of Science Honors | | Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment | Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy, |
| 9DSEC2 | E-1 Toxicology (3) | Degree in Bachelor of Science Honors | | Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment | Formative and Summative Assessment/ Evaluation/ Analysis of result/ Application of Heutagogy, |
| 9 Skill Enhancement Course | Cattle Farming (3) | Degree in Bachelor of Science Honors | | Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment | Formative and Summative Assessment/ Evaluation/ Analysis of result/ Application of Heutagogy, |
| 10 A 19 Major | Physiology of Reproduction (3) | Degree in Bachelor of Science Honors | Lab on Reproductive Physiology (2) | Lectures/Videos/ Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment | Formative and Summative Assessment /Evaluation/ Analysis of result/ Application of Heutagogy. |
| 10 A 20 Major | Developmental Biology (3) | Degree in Bachelor of Science Honors | | Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment | Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy, |
| 10 A 21 Major | Chronobiology (3) | Degree in Bachelor of Science Honors | | Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Lab/Formative Assessment/ Summative Assessment | Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy, |

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| 10 A 22 | Nano Biotechnology (3) | Degree in Bachelor of Science Honors | | Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment | Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy, |
| 10 DSEC 1 | Research project or any two des. or internship (6) | Degree in Bachelor of Science Honors | | Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment | Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy, |
| 10 DSEC 2 | E-3 Insect Vector & Diseases (3) | Degree in Bachelor of Science Honors | | Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment | Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy, |
| 10 DSEC 3 | E-3 Human Physiology (3) | Degree in Bachelor of Science Honors | | Lectures/Videos/ Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment | Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy |
| 10 DSEC 4 | E-3 Food, Nutrition & Health (3) | Degree in Bachelor of Science Honors | | Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment | Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy, |
| 10 Skill Enhancement | E-3 Animal Breeding Techniques (3) | Degree in Bachelor of Science Honors | | Lectures/Videos / Seminars/Case study/Project/ Group discussion/Visit to Industry/Formative Assessment/ Summative Assessment | Formative and Summative Assessment/Evaluation/ Analysis of result/ Application of Heutagogy, |
| EXIT OPTION WITH M. Sc. DEGREE (268 CREDITS) | | | | | |

I Semester BSc Zoology Core Course Content

| | |
|--|---------------------------------------|
| Course Title/Code: Cytology, Genetics and Infectious Diseases | Course Credits: 4 |
| Course Code: DSCC5Z00T1 | L-T-P per week: 4-0-0 |
| Total Contact Hours: 56 | Duration of ESA: 3 Hours |
| Formative Assessment Marks: 40 | Summative Assessment Marks: 60 |
| Model Syllabus Authors: | |

Core Course prerequisite: To study Zoology in undergraduate, student must have studied Biology or equivalent subject in Class 12.

Course Outcomes (COs):

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

1. The structure and function of the cell organelles.
2. The chromatin structure and its location.
3. The basic principle of life, how a cell divides leading to the growth of an
4. Organism and also reproduces to form a new organism.
5. How a cell communicates with its neighboring cells?
6. The principles of inheritance, Mendel 's laws and the deviations.
7. How environment plays an important role by interacting with genetic factors.
8. Detect chromosomal aberrations in humans and study of pedigree analysis.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

| Course Outcomes (COs) / Program Outcomes (POs) | CC T1 | CC 2 | CC 3 | CC 4 | CC 5 | CC 6 | CC 7 | CC 8 | CC 9 | CC 10 | CC 11 |
|--|-------|------|------|------|------|------|------|------|------|-------|-------|
| I Core competency | X | | | | | | | | | | |
| II Critical thinking | X | | | | | | | | | | |
| III Analytical reasoning | X | | | | | | | | | | |
| IV Research skills | X | | | | | | | | | | |
| V Team work | X | | | | | | | | | | |

Note: Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark =X 'in the intersection cell if a course outcome addresses a particular program outcome.

Semester I- Zoology Core Course I Content:

| Content | Hours |
|---|-----------|
| Unit | 14 |
| Chapter 1. Ultra structure and Function of Cell Organelles I in Animal Cell <ul style="list-style-type: none"> • Plasma membrane: Chemical composition—Fluid mosaic model • Endomembrane system: protein targeting and sorting, transport, endocytosis and exocytosis, types of cell junctions | |

| | |
|---|-----------|
| <p>Chapter 2. Structure and Function of Cell Organelles II in Animal Cell</p> <ul style="list-style-type: none"> • Cytoskeleton: microtubules, microfilaments, intermediate filaments • Mitochondria: Structure, oxidative phosphorylation; electron transport system. Endoplasmic reticulum: Structure, and function. • Peroxisome and Ribosome: structure and function | |
| Unit II | 14 |
| <p>Chapter 3. Nucleus and Chromatin Structure</p> <ul style="list-style-type: none"> • Structure and function of nucleus in eukaryotes • Chemical structure and base composition of DNA and RNA • Ultra structure of eukaryotic chromosome, Chromatin Organization-Nucleosome model • Types of DNA and RNA | |
| <p>Chapter 4. Cell cycle, Cell Division and Cell Signaling</p> <ul style="list-style-type: none"> • Cell division: mitosis and meiosis • Introduction to Cell cycle and its regulation, apoptosis • Signal transduction: intracellular signaling and cell surface receptors, via G-protein linked receptors. • Cell-cell interaction: -autocrine, paracrine and endocrine types. | |
| Unit III | 14 |
| <p>Chapter 5. Mendelism and Sex Determination</p> <ul style="list-style-type: none"> • Basic principles of heredity: Mendel 's laws- monohybrid cross and dihybrid cross • Incomplete Dominance • Genetic Sex-Determining Systems, Environmental Sex Determination, • Chromosomal Sex Determination and mechanism in <i>Drosophila melanogaster</i>. • Sex-linked characteristics in humans and dosage compensation. | |
| <p>Chapter 6. Extensions of Mendelism, Genes and Environment</p> <ul style="list-style-type: none"> • Extensions of Mendelism: Multiple Alleles, Gene Interaction-inheritance of comb pattern in fowl. • The Interaction Between Sex and Heredity: Sex-Influenced and Sex-Limited Characteristics • Cytoplasmic Inheritance- Kappa particles in Paramecium, Genetic Maternal Effects. • Interaction between Genes and Environment. • Inheritance of Continuous Characteristics. | |
| Unit IV | 14 |
| <p>Chapter 7. Human Chromosomes and Patterns of Inheritance</p> <ul style="list-style-type: none"> • Patterns of inheritance: autosomal dominance, autosomal recessive, X-linked recessive, X-linked dominant. • Chromosomal anomalies: Structural and numerical aberrations with examples. • Human karyotyping and Pedigree analysis. | |
| <p>Chapter 8. Infectious Diseases</p> <ul style="list-style-type: none"> • Introduction to human pathogenic organisms- viruses, bacteria, fungi, protozoa and helminths worms. • Structure, life cycle, pathogenicity, including diseases, causes, symptoms and control of common parasites: <i>Trypanosoma</i>, <i>Giardia</i> and <i>Wuchereria</i>. | |

Suggested Readings:

1. Lodish et al: Molecular Cell Biology: Freeman & Co, USA (2004).
2. Alberts et al: Molecular Biology of the Cell: Garland (2002).
3. Cooper: Cell: A Molecular Approach: ASM Press (2000).
4. Karp: Cell and Molecular Biology: Wiley (2002). Pierce B. Genetics. Freeman (2004).
5. Lewin B. Genes VIII. Pearson (2004).
6. Watson et al. Molecular Biology of the Gene. Pearson (2004).
7. Thomas J. Kindt, Richard A. Goldsby, Barbara A. Osborne, Janis Kuby- Kuby Immunology. W H Freeman (2007).
8. Delves Peter J., Martin Seamus J., Burton Dennis R., Roitt Ivan M. Roitt's Essential Immunology, 13th Edition. Wiley Blackwell (2017).
9. Principles of Genetics by B. D. Singh
10. Cell-Biology by C. B. Pawar, Kalyani Publications
11. Economic Zoology by Shukla and Upadhyaya

Pedagogy: Written Assignment/Presentation/Project / Term Papers/Seminar

| Formative Assessment | |
|---|---------------------|
| Assessment Occasion | Weightage in |
| House Examination/Test | 20 |
| Written Assignment/Presentation/Project / Term | 15 |
| Class performance/Participation | 05 |
| Total | 40 |

Zoology Core Lab Course Content

Semester I

| | |
|--|---------------------------------------|
| Course Title: Cell Biology &Cytogenetics Lab | Course Credits:2 |
| Course Code: DSCC5Z00P1 | L-T-P per week: 0-0-4 |
| Total Contact Hours: 56 | Duration of ESA: 4 Hours |
| Formative Assessment Marks: 25 | Summative Assessment Marks: 25 |
| Model Syllabus Authors: | |

Course Outcomes (COs):

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

1. To use simple and compound microscopes.
2. To prepare stained slides to observe the cell organelles.
3. To be familiar with the basic principle of life, how a cell divides leading to the growth of an organism and also reproduces to form new organisms.
4. The chromosomal aberrations by preparing karyotypes.
5. How chromosomal aberrations are inherited in humans by pedigree analysis in families. The antigen-antibody reaction.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

| Course Outcomes (COs) / Program Outcomes (POs) | CC P1 | CC 2 | CC 3 | CC 4 | CC 5 | CC 6 | CC 7 | CC 8 | CC 9 | CC 10 | CC 11 |
|---|--------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|--------------|
| I Core competency | X | | | | | | | | | | |
| II Critical thinking | X | | | | | | | | | | |
| III Analytical reasoning | X | | | | | | | | | | |
| IV Research skills | X | | | | | | | | | | |
| V Team work | X | | | | | | | | | | |

Lab Course Content

| List of labs to be conducted | 56 h rs. |
|--|----------|
| <ol style="list-style-type: none"> 1. Understanding of simple and compound microscopes. 2. To study different cell types such as buccal epithelial cells, striated muscle cells using Methylene blue/any suitable stain (virtual/ slide/slaughtered tissue). 3. To study the different stages of Mitosis in root tip of <i>Allium cepa</i>. 4. To study the different stages of Meiosis in grasshopper testis (virtual/ slides). 5. To check the permeability of cells using salt solution of different concentrations. 6. Study of parasites in humans (e.g. Protozoans, Helminthes in compliance with examples being studied in theory) permanent micro slides. 7. To learn the procedures of preparation of temporary slides (fish scale) and permanent slides, with available mounting material (sex comb of <i>Drosophila</i>/ insect mouth parts). 8. Study of life cycles of <i>Drosophila</i> sp. (from Cultures or Photographs). 9. Preparation of polytene chromosomes (<i>Chironomus</i> larva or <i>Drosophila</i> larva). 10. Preparation of human karyotype and study the chromosomal structural and numerical aberrations from the pictures provided. (Virtual/optional). 11. To prepare family pedigrees. 12. https://www.vlab.co.in 13. https://zoologysan.blogspot.com 14. www.vlab.iitb.ac.in/vlab 15. www.onlinelabs.in 16. www.powershow.com 17. https://vlab.amrita.eduhttps://sites.dartmouth.edu/ | |

Suggested Readings:

1. Lodish et al: Molecular Cell Biology: Freeman & Co, USA (2004).
2. Alberts et al: Molecular Biology of the Cell: Garland (2002).
3. Cooper: Cell: A Molecular Approach: ASM Press (2000).
4. Karp: Cell and Molecular Biology: Wiley (2002). Pierce B. Genetics. Freeman (2004).
5. Thomas J. Kindt, Richard A. Goldsby, Barbara A. Osborne, Janis Kuby- Kuby Immunology. W H Freeman (2007).
6. Kesar, Saroj and Vasishta N.2007 Experimental Physiology: Comprehensive Manual. Heritage Publishers, NewDelhi.

Pedagogy: Written Assignment/Presentation/Project / Term Papers/Seminar

| Formative Assessment | |
|--|--------------------|
| Assessment Occasion | Weightage in Marks |
| House Examination/Test | 05 |
| Written Assignment/Presentation/Project /Term papers/Seminar | 05 |
| Records | 05 |
| Viva | 05 |
| Class performance/Participation | 05 |
| Total | 25 |

Open Elective Course Content

I Semester

| | | |
|--|---------------------------------------|---------------|
| Course Title: Economic Zoology Course Code: OEC5ZOOT1 | Course Credits: 3 | Course |
| Total Contact Hours: 42 | Duration of ESA: 3 Hours | |
| Formative Assessment Marks: 40 | Summative Assessment Marks: 60 | |

Outcomes

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

1. Gain knowledge about silkworms rearing and their products.
2. Gain knowledge in Bee keeping equipment and apiary management.
3. Acquaint knowledge on dairy animal management, the breeds and diseases of cattle and learn the testing of egg and milk quality.
4. Acquaint knowledge about the culture techniques of fish and poultry.
5. Acquaint the knowledge about basic procedure and methodology of Vermiculture.
6. Learn various concepts of laccultivation.
7. Students can start their own business i.e. self-employments.
8. Get employment in different applied sectors

Course Content

| Content | Hrs. |
|---|-----------|
| Unit I | 14 |
| <p>Chapter 1. Sericulture:</p> <ul style="list-style-type: none"> • History and present status of sericulture in India • Mulberry and non-mulberry species in Karnataka and India • Mulberry cultivation • Morphology and life cycle of <i>Bombyx mori</i> • Silk worm rearing techniques: Processing of cocoon, reeling • Silk worm diseases-pests and their control <p>Chapter 2. Apiculture:</p> <ul style="list-style-type: none"> • Introduction and present status of apiculture • Species of honey bees in India, life cycle of <i>Apis indica</i> • Colony organization, division of labour and communication • Bee keeping as an agro based industry; methods and equipments: indigenous methods, extraction appliances, extraction of honey from the comb and processing • Bee pasturage, honey and bees wax and their uses • Pests and diseases of bees and their management | |
| Unit II | 14 |
| <p>Chapter 3. Live Stock Management:</p> <ul style="list-style-type: none"> • Dairy: Introduction to common dairy animals and techniques of dairy management • Types, loose housing system and conventional barn system; advantages and limitations of dairy farming • Establishment of dairy farm and choosing suitable dairy animals-cattle • Cattle feeds, milk and milk products • Cattle diseases • Poultry: Types of breeds and their rearing methods • Feed formulations for chicks • Nutritive value of egg and meat • Disease of poultry and control measures <p>Chapter 4. Aquaculture:</p> <ul style="list-style-type: none"> • Aquaculture in India: An overview and present status and scope of aquaculture • Types of aquaculture: Pond culture: Construction, maintenance and management; carp culture, shrimp culture, shellfish culture, composite fish culture and pearl culture | |

| Unit - III | 14 |
|--|-----------|
| <p>Chapter 5. Fish culture:</p> <ul style="list-style-type: none"> • Common fishes used for culture. • Fishing crafts and gears. • Ornamental fish culture: Fresh water ornamental fishes- biology, breeding techniques • Construction and maintenance of aquarium: Construction of home aquarium, materials used, setting up of freshwater aquaria, aquarium plants, ornamental objects, cleaning the aquarium, maintenance of water quality. control of snail and algal growth. • Modern techniques of fish seed production <p>Chapter 6. Prawn culture:</p> <ul style="list-style-type: none"> • Culture of fresh and marine water prawns. • Preparation of farm. • Preservation and processing of prawn, export of prawn. <p>Chapter 7. Vermiculture:</p> <ul style="list-style-type: none"> • Scope of Vermiculture. • Types of earthworms. • Habit categories - epigeic, endogeic and anecic; indigenous and exotic species. • Methodology of vermicomposting: containers for culturing, raw materials required, preparation of bed, environmental pre-requisites, feeding, harvesting and storage of Vermicompost. • Advantages of vermicomposting. Diseases and pests of earthworms. | |
| <p>Chapter 8. Lac Culture:</p> <ul style="list-style-type: none"> • History of lac and its organization, lac production in India. Life cycle, host plants and strains of lac insect. • Lac cultivation: Local practice, improved practice, propagation of lac insect, inoculation period, harvesting of lac. • Lac composition, processing, products, uses and their pests | |

Text Books & Suggested Readings:

1. Eikichi, H. (1999). Silkworm Breeding (Translated from Japanese). Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
2. Ganga, G. (2003). Comprehensive Sericulture Vol-II: Silkworm Rearing and Silk Reeling.
3. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
4. Mahadevappa, D., Halliyal, V.G., Shankar, D.G. and Bhandiwad, R., (2000). Mulberry Silk
5. Reeling Technology Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
6. Roger, M (1990). The ABC and Xyz of Bee Culture: An Encyclopedia of Beekeeping, Kindle Edition.
7. Shukla and Upadhyaya (2002). Economic Zoology, Rastogi Publishers
8. Yadav Manju (2003). Economic Zoology, Discovery Publishing House.
9. Jabde Pradip V (2005). Textbook of applied Zoology, Discovery Publishing House, New Delhi.
10. Cherian & Ramachandran Bee keeping in-South Indian Govt. Press, Madras.
11. Sathe, T.V. Vermiculture and Organic farming.
12. Bard, J (1986). Handbook of Tropical Aquaculture.
13. Santhanam, R. A. Manual of Aquaculture.
14. Zuka, R.I and Hamiyn (1971). Aquarium fishes and plants
15. Jabde, P.V. (2005) Text Book of Applied Zoology: Vermiculture, Apiculture, Sericulture, Lac culture.
16. Animal Disease- Bairagi K. N. Anmol Publications Pvt.Ltd 2014
17. Economics Of Aquaculture - Singh (R.K.P) - Danika Publishing Company 2003
18. Applied and Economic Zoology (SWAYAM) web https://swayam.gov.in/nd2_cec20_ge23/preview

Course Books published in English and Kannada may be prescribed by the Universities and Colleges

Pedagogy: Chalk and Talk, PPT, Group discussion, Seminar, Field visit

| Formative Assessment | |
|--|---------------------------|
| Assessment Occasion | Weightage in Marks |
| House Examination/Test | 15 |
| Written Assignment/Presentation/Project / Term Papers/Seminar | 20 |
| Class performance/Participation | 05 |
| Total | 40 |

Skill Enhancement Course in Zoology

Course Content

Semester: I

| | |
|--|---------------------------------------|
| Course Title: Vermiculture Course Code: VEC5ZOOP1 | Course Credits: 2 |
| Total Contact Hours: 56 Hours | Duration of ESA: 3 Hrs. |
| Formative Assessment Marks: 25 | Summative Assessment Marks: 25 |
| Model Syllabus Authors: | |

Course Outcomes (COs):

At the end of the course the student:

1. Understands the importance of earthworms in maintaining soil quality.
2. Learns that the vermicomposting is an effective organic solid waste management method.
3. Gets acquainted with the importance of earthworms in agro-based economic activity.
4. Vermicomposting leads to organic farming and healthy food production.
5. Vermicomposting may be taken up as a small scale industry by the farmers and unemployed youth.
6. Get jobs in teaching institutions or Vermiculture units as technicians.
7. Learn the concept of vermicomposting as bio fertilizers thus student can become an entrepreneur after completion of the course.
8. Best opportunity for self-employment and lifelong learning with farmers.

Course Content

| List of labs to be conducted | | 56Hr |
|-------------------------------------|---|-------------|
| 1 | Collection of native earth worm species to study habit and habitat. | |
| 2 | Keys to identify different species of earth worm. | |
| 3 | Externals and Life cycle of <i>Eisenia fetida</i> and <i>Eudrilus eugeniae</i> . | |
| 4 | Dissection of digestive and reproductive system. | |
| 5 | Study of vermicomposting equipments and devices. | |
| 6 | Preparation of vermi beds and their maintenance. | |
| 7 | Study of different vermicomposting methods. | |
| 8 | Harvesting, separation of worms, packaging, transport and storage of Vermicompost. | |
| 9 | Vermi-wash collection and processing. | |
| 10 | Small scale earth worm farming for home gardens and studying the effect of Vermicompost on garden plants. | |
| 11 | Budget and cost scenario of Vermiculture (Project). | |
| 12 | Diseases and natural enemies of earth worms and their control measures. | |
| 13 | Role of vermitechnology in environmental protection. | |
| 14 | Economics and Marketing of Vermicompost and vermi wash. | |
| 15 | Visit to Vermiculture farm to acquaint with latest techniques. | |

Text Books and references

1. Bhatt J.V. & S.R. Khambata (1959) -Role of Earthworms in Agriculture|| Indian Council of Agricultural Research, New Delhi
2. Edwards, C.A. and J.R. Lofty (1977) -Biology of Earthworms|| Chapman and Hall Ltd., London.
3. Lee, K.E. (1985) -Earthworms: Their ecology and Relationship with Soils and Land Use|| Academic Press, Sydney.
4. Dash, M.C., B.K. Senapati, P.C. Mishra (1980) — Vermis and Vermicomposting|| Proceedings of the National Seminar on Organic Waste Utilization and Vermicomposting Dec. 5-8, 1984, (Part B), School of Life Sciences, Sambalpur University, Jyoti Vihar, Orissa.
5. Kevin, A and K.E. Lee (1989) — Earthworm for Gardeners and Fisherman|| (CSIRO, Australia, Division of Soils)
6. Satchel, J.E. (1983) -Earthworm Ecology|| Chapman Hall, London.
7. Wallwork, J.A. (1983) -Earthworm Biology|| Edward Arnold (Publishers) Ltd. London.

Pedagogy

1. Demonstration
2. Assignment
3. Group discussion
4. Field visit
5. Use of Audio-Visual aids.

| Formative Assessment | |
|---------------------------------------|---------------------------|
| Assessment Occasion | Weightage in Marks |
| Class Test | 05 |
| Attendance and Assignments | 05 |
| Visit to Vermicompost unit and report | 05 |
| Record/report | 05 |
| Viva | 05 |
| Total | 25 |

Course pattern and scheme of examination for B.Sc./ B.Sc. (Hons.) as per NEP (2021-22 onwards)

Subject: ZOOLOGY

| SL No. | Semester | Title of the paper | Teaching hours | Hours / week | | Examination Pattern Max. & Min. Marks /Paper | | | | | | Duration of Exam (hours) | | Total Marks / paper | Credits | |
|--------|----------|--------------------------|----------------|--------------|-----------|--|------|----|-----------|------|----|--------------------------|-----------|---------------------|---------|-----------|
| | | | | Theory | Practical | Theory | | | Practical | | | Theory | Practical | | Theory | Practical |
| | | | | | | Max. | MIN. | IA | Max. | MIN. | IA | | | | | |
| 1 | I | CORE subject | 56 | 4 | 4 | 60 | 22 | 40 | 25 | 9 | 25 | 3 | 4 | 150 | 4 | 2 |
| | | Open elective | 42 | 3 | - | 60 | 22 | 40 | - | - | - | 3 | - | 100 | 3 | - |
| | | Skill Enhancement Course | 56 | - | 4 | - | - | - | 25 | 9 | 25 | - | 3 | 50 | - | 2 |
| 2 | II | CORE subject | 56 | 4 | 4 | 60 | 22 | 40 | 25 | 9 | 25 | 3 | 4 | 150 | 4 | 2 |
| | | Open elective | 42 | 3 | - | 60 | 22 | 40 | - | - | - | 3 | - | 100 | 3 | - |
| | | Skill Enhancement Course | 56 | - | 4 | - | - | - | 25 | 9 | 25 | - | 3 | 50 | - | 2 |

Scheme of Internal Assessment Marks: Theory

| Sl. No | Particulars | IA Marks |
|--------|--|-----------|
| 1 | Attendance | 05 |
| 2 | Internal Tests (Minimum of Two) | 20 |
| 3 | Assignments /Seminar / Case Study / Project work / Reports on - Field visits made for observation and collection of data etc., | 15 |
| | TOTAL Theory IA Marks | 40 |

Scheme of Internal Assessment: Marks Practicals

| Sl. No. | Particulars | IA Marks |
|---------|--|-----------|
| 1 | Practical Test | 05 |
| 2 | Submission of Project Report | 05 |
| 3 | Viva-voce on project report | 05 |
| 4 | Active participation in practical classes (Attendance) | 05 |
| 5 | Practical Record(s) | 05 |
| | TOTAL Theory IA Marks | 25 |

BLUEPRINT FOR PREPARATION OF QUESTION PAPER ZOOLOGY
Paper: Cytology, Genetics and Infectious Diseases
Course Code: DSCC5Z00T1

| Unit | Teaching (hrs) | Number of questions | | | | Total marks |
|-------|-------------------|---------------------|-----------------|-----------------|------------------|-------------|
| | | 05 (1 mark) | 07 (3 marks) | 06 (5 marks) | 04 (10 marks) | |
| I | 14 | 1 | 3 | 1 | 1 | 25 |
| II | 14 | 1 | 1 | 2 | 1 | 24 |
| III | 14 | 2 | 2 | 1 | 1 | 23 |
| IV | 14 | 1 | 1 | 2 | 1 | 24 |
| Total | 56 | 1x5=5 | 3x7=21 | 5x6=30 | 10x4=40 | 96 |

Model Question: I Semester B.Sc. Degree examination
ZOOLOGY
Paper: Cytology, Genetics and Infectious Diseases
Course Code: DSCC5Z00T1

Time: 3 Hrs

Maximum Marks: 60

Instructions to Candidates:

1. Draw neat labelled diagrams wherever necessary.
2. Answer should be completely in English.

PART- A

- I. Answer the following in one word or one sentence (5x1=5)
1. _____ is the protein present in microfilament of cell.
 2. The nitrogenous base Uracil is found in DNA. True/False?
 3. Write the phenotypic ratio of Mendel's dihybrid cross?
 4. Beard in males is an example of a _____ trait.
 5. Name the causative agent of giardiasis.

PART- B

- II. Answer any **five** of the following: (5x3=15)
1. Mention the cytoskeletal structures present in an animal cell.
 2. List any three functions of endoplasmic reticulum.
 3. Describe the structure of the peroxisome.
 4. What are the types of RNA present in a cell?
 5. What is Lygaeus type of sex determination?
 6. Write the genotype of A, B and AB blood groups.
 7. What is X linked inheritance? Give an example.

PART- C

- III. Answer any **four** of the following (4x5=20)
1. Describe the function of the mitochondrion.
 2. Explain stages of Zygotene and Pachytene of Prophase I of meiosis.
 3. Write short notes on cell surface receptors.
 4. Elucidate cytoplasmic inheritance with reference to kappa particles in *Paramecium*.
 5. With an example explain autosomal recessive pattern of inheritance.
 6. Give the occurrence, disease caused, mode of transmission and preventive measures of *Wuchereria bancrofti*.

PART- D

- IV. Answer any **two** of the following (2x10=20)
1. With a neat labelled diagram describe the fluid mosaic model of the plasma membrane.
 2. a. Describe the structure of the eukaryotic nucleus.
b. Draw and label the cell cycle.
 3. With reference to inheritance of Comb shape in poultry fowls, work out the following crosses:
 - a) Homozygous rose comb is crossed with single comb
 - b) Homozygous pea comb is crossed with single comb
 - c) Conduct a cross between F₁ of a & b, find the offspring.
 4. With suitable diagrams explain the life cycle of *Trypanosoma*.

Scheme of Practical Examination
I Semester BSc. Zoology
Cytology, Genetics and Infectious diseases
Course Code: DSCC5Z00P1

Duration: 4 hours

Max. Marks: 25

1. Prepare a temporary squash of the given material. Identify & comment on stage observed.
(For mitosis or meiosis) (08 M)
- OR
- Stain, identify and comment on the given cells/tissue (epithelial/buccal cells)
2. Prepare a whole mount of the given material (Fish scale/Mouthparts of insect) (05 M)
 3. Mount and stain the Polytene chromosome/sex comb of *Drosophila*. Comment. (07 M)
 4. Identify and comment on the given spotters A and B (2.5 X 2= 05 M)
Infectious pathogens/ Identify the given karyotype and comment / Pedigree analysis (any two as A and B).

Scheme of Practical Examination
I Semester BSc. Zoology
Skill Enhancement course: Vermiculture

Duration: 3 hours

Max. marks: 25

1. Identify and describe the given system of the given specimen/chart 'A' given, with neat labelled diagram. (05 marks)
2. Identify and comment on the spotters B to E (Life cycle/Externals/Devices used in vermicomposting/ Vermicompost types) (4x5=20 marks)

TOTAL = 25 Marks

BANGALORE UNIVERSITY
ZOOLOGY B. Sc (UG) (CBCS)
BLUEPRINT FOR PREPARATION OF QUESTION PAPER II
Biochemistry and Physiology
Course Code: DSCC5Z00T2

| Unit | Teaching (hrs) | Number of questions | | | | Total marks |
|-------|----------------|---------------------|--------------|--------------|---------------|-------------|
| | | 05 (1 mark) | 07 (3 marks) | 06 (5 marks) | 04 (10 marks) | |
| I | 14 | 1 | 3 | 1 | 1 | 25 |
| II | 14 | 1 | 1 | 2 | 1 | 24 |
| III | 14 | 2 | 2 | 1 | 1 | 23 |
| IV | 14 | 1 | 1 | 2 | 1 | 24 |
| Total | 56 | 1x5=5 | 3x7=21 | 5x6=30 | 10x4=40 | 96 |

B.Sc. SEMESTER I & II
Model Question Paper
Zoology Open Elective (OE)

Time: 3 Hrs

Maximum Marks: 60

Instructions to Candidates:

1. All sections/parts are compulsory.
2. Draw neat labelled diagrams wherever necessary.

PART- A

I. Answer any **five** of the following

(5x2=10)

1. .
2. .
3. .
4. .
5. .
6. .
7. .

PART- B

II. Answer any **five** of the following

(5x4=20)

1. .
2. .
3. .
4. .
5. .
6. .

PART- C

III. Answer any **three** of the following

(3x10=30)

1. .
2. .
3. .
4. .