



KARNATAK UNIVERSITY, DHARWAD
ACADEMIC (S&T) SECTION
ಕರ್ನಾಟಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಧಾರವಾಡ
ವಿದ್ಯಾಮಂಡಳ (ಎಸ್&ಟಿ) ವಿಭಾಗ



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NAAC Accredited
 'A' Grade 2014

website: kud.ac.in

No.KU/Aca(S&T)/RPH-394A/2021-22/1155

Date: 29 OCT 2021

ಅಧಿಸೂಚನೆ

ವಿಷಯ: 2021-22ನೇ ಶೈಕ್ಷಣಿಕ ಸಾಲಿನಿಂದ ಎಲ್ಲ ಸ್ನಾತಕ ಕೋರ್ಸುಗಳಿಗೆ 1 ಮತ್ತು 2ನೇ ಸೆಮಿಸ್ಟರ್ NEP-2020 ಮಾದರಿಯ ಪಠ್ಯಕ್ರಮವನ್ನು ಅಳವಡಿಸಿರುವ ಕುರಿತು.

- ಉಲ್ಲೇಖ: 1. ಸರ್ಕಾರದ ಅಧೀನ ಕಾರ್ಯದರ್ಶಿಗಳು(ವಿಶ್ವವಿದ್ಯಾಲಯ 1) ಉನ್ನತ ಶಿಕ್ಷಣ ಇಲಾಖೆ ಇವರ ಆದೇಶ ಸಂಖ್ಯೆ: ಇಡಿ 260 ಯುಎನ್‌ಇ 2019(ಭಾಗ-1), ದಿ:7.8.2021.
 2. ವಿಶೇಷ ವಿದ್ಯಾವಿಷಯಕ ಪರಿಷತ್ ಸಭೆಯ ನಿರ್ಣಯ ದಿನಾಂಕ: 19.08.2021
 3. ಈ ಕಚೇರಿ ಸುತ್ತೋಲೆ ಸಂ.No. KU/Aca(S&T)/RPH-394A/2021-22/18 ದಿ:21.08.2021.
 4. ಸರ್ಕಾರಿ ಆದೇಶ ಸಂ ಇಡಿ 260 ಯುಎನ್‌ಇ 2019(ಭಾಗ-1),ಬೆಂಗಳೂರು ದಿ. 15.9.2021.
 5. ಎಲ್ಲ ಅಭ್ಯಾಸಸೂಚಿ ಮಂಡಳಿ ಸಭೆಗಳ ನಡವಳಿಗಳು
 6. ಎಲ್ಲ ನಿಖಾಯಗಳ ಸಭೆಗಳು ಜರುಗಿದ ದಿನಾಂಕ: 24,25-09-2021.
 7. ವಿಶೇಷ ವಿದ್ಯಾವಿಷಯಕ ಪರಿಷತ್ ಸಭೆಯ ನಿರ್ಣಯ ಸಂಖ್ಯೆ: 01 ದಿನಾಂಕ: 28.9.2021.
 8. ಈ ಕಚೇರಿ ಸುತ್ತೋಲೆ ಸಂ.No. KU/Aca(S&T)/RPH-394A/2021-22/954 ದಿ:30.09.2021.
 9. ಎಲ್ಲ ನಿಖಾಯದ ಡೀನರು / ಸಂಪನ್ಮೂಲ ತಜ್ಞರ ಸಭೆ ದಿನಾಂಕ 21.10.2021.
 10. ಎಲ್ಲ ಸ್ನಾತಕ ಅಭ್ಯಾಸಸೂಚಿ ಮಂಡಳಿ ಅಧ್ಯಕ್ಷರುಗಳ ಸಭೆ ದಿನಾಂಕ 22.10.2021.
 11. ವಿಶೇಷ ವಿದ್ಯಾವಿಷಯಕ ಪರಿಷತ್ ಸಭೆಯ ನಿರ್ಣಯ ಸಂಖ್ಯೆ: 01 ದಿನಾಂಕ: 27.10.2021.
 12. ಮಾನ್ಯ ಕುಲಪತಿಗಳ ಆದೇಶ ದಿನಾಂಕ: 29-10-2021

ಮೇಲ್ಕಾಣಿಸಿದ ವಿಷಯ ಹಾಗೂ ಉಲ್ಲೇಖಗಳನ್ವಯ ಮಾನ್ಯ ಕುಲಪತಿಗಳ ಆದೇಶದ ಮೇರೆಗೆ, 2021-22ನೇ ಶೈಕ್ಷಣಿಕ ಸಾಲಿನಿಂದ ಅನ್ವಯವಾಗುವಂತೆ, ಎಲ್ಲ B.A./ BPA (Music)/BVA/ BTM/ BSW/ B.Sc./B.Sc. Pulp & Paper Science/ B.Sc. (H.M)/ BCA/ B.A.S.L.P./ B.Com/ B.Com (CS)/ & BBA ಸ್ನಾತಕ ಕೋರ್ಸುಗಳ 1 ಮತ್ತು 2ನೇ ಸೆಮಿಸ್ಟರ್‌ಗಳಿಗೆ NEP-2020 ರಂತೆ ವಿಶೇಷ ವಿದ್ಯಾವಿಷಯಕ ಪರಿಷತ್ ಸಭೆಯ ಅನುಮೋದಿತ ಪಠ್ಯಕ್ರಮಗಳನ್ನು ಈಗಾಗಲೇ ಪ್ರಕಟಪಡಿಸಿದ್ದು, ಮುಂದೆ ದಿನಾಂಕ 04.10.2021 ವರೆಗೆ ಸರ್ಕಾರವು ಕಾಲಕಾಲಕ್ಕೆ ನೀಡಿದ ನಿರ್ದೇಶನಗಳನ್ನು ಅಳವಡಿಸಿಕೊಂಡು ದಿನಾಂಕ 27.10.2021 ರಂದು ಜರುಗಿದ ವಿದ್ಯಾವಿಷಯಕ ಪರಿಷತ್ ಸಭೆಯಲ್ಲಿ ಅನುಮೋದನೆ ಪಡೆದು ಕ.ವಿ.ವಿ. ಅಂತರ್ಜಾಲ www.kud.ac.in ದಲ್ಲಿ ಭಿತ್ತರಿಸಲಾಗಿದೆ. ಸದರ ಪಠ್ಯಕ್ರಮಗಳನ್ನು ಕ.ವಿ.ವಿ. ಅಂತರ್ಜಾಲದಿಂದ ಡೌನ್‌ಲೋಡ್ ಮಾಡಿಕೊಳ್ಳಲು ಸೂಚಿಸುತ್ತ ವಿದ್ಯಾರ್ಥಿಗಳ ಹಾಗೂ ಸಂಬಂಧಿಸಿದ ಎಲ್ಲ ಬೋಧಕರ ಗಮನಕ್ಕೆ ತಂದು ಅದರಂತೆ ಕಾರ್ಯಪ್ರವೃತ್ತರಾಗಲು ಕವಿವಿ ಅಧೀನದ/ಸಂಲಗ್ನ ಮಹಾವಿದ್ಯಾಲಯಗಳ ಪ್ರಾಚಾರ್ಯರುಗಳಿಗೆ ಸೂಚಿಸಲಾಗಿದೆ.

Handwritten signature and date: 29/10/21
 ಕುಲಸಚಿವರು.

ಅಡಕ: ಮೇಲಿನಂತೆ
 ಗೆ.

ಕರ್ನಾಟಕ ವಿಶ್ವವಿದ್ಯಾಲಯದ ವ್ಯಾಪ್ತಿಯಲ್ಲಿ ಬರುವ ಎಲ್ಲ ಅಧೀನ ಹಾಗೂ ಸಂಲಗ್ನ ಮಹಾವಿದ್ಯಾಲಯಗಳ ಪ್ರಾಚಾರ್ಯರುಗಳಿಗೆ. (ಕ.ವಿ.ವಿ. ಅಂತರ್ಜಾಲ ಹಾಗೂ ಮಿಂಚಂಚೆ ಮೂಲಕ ಭಿತ್ತರಿಸಲಾಗುವುದು)

ಪ್ರತಿ:

1. ಕುಲಪತಿಗಳ ಆಪ್ತ ಕಾರ್ಯದರ್ಶಿಗಳು, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ.
2. ಕುಲಸಚಿವರ ಆಪ್ತ ಕಾರ್ಯದರ್ಶಿಗಳು, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ.
3. ಕುಲಸಚಿವರು (ಮೌಲ್ಯಮಾಪನ) ಆಪ್ತ ಕಾರ್ಯದರ್ಶಿಗಳು, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ.
4. ಅಧೀಕ್ಷಕರು, ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆ / ಗೌಪ್ಯ / ಜಿ.ಎ.ಡಿ. / ವಿದ್ಯಾಂಡಳ (ಪಿ.ಜಿ.ಪಿ.ಎಚ್.ಡಿ) ವಿಭಾಗ, ಸಂಬಂಧಿಸಿದ ಕೋರ್ಸುಗಳ ವಿಭಾಗಗಳು ಪರೀಕ್ಷಾ ವಿಭಾಗ, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ.
5. ನಿರ್ದೇಶಕರು, ಕಾಲೇಜು ಅಭಿವೃದ್ಧಿ / ವಿದ್ಯಾರ್ಥಿ ಕಲ್ಯಾಣ ವಿಭಾಗ, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ.



Practical Subject

KARNATAK UNIVERSITY, DHARWAD

04 - Year B.Sc. (Hons.) Program

SYLLABUS

Subject: ZOOLOGY

[Effective from 2021-22]

**DISCIPLINE SPECIFIC CORE COURSE (DSCC) FOR SEM I & II,
OPEN ELECTIVE COURSE (OEC) FOR SEM I & II and
SKILL ENHANCEMENT COURSE (SEC) FOR SEM I**

AS PER N E P - 2020

Karnatak University, Dharwad
Four Years Under Graduate Program in Zoology for B.Sc. (Hons.)
Effective from 2021-22

Sem	Type of Course	Theory/ Practical	Instruction hour per week	Total hours of Syllabus / Sem	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks	Credits
I	DSCC 1	Theory	04hrs	56	02 hrs	40	60	100	04
		Practical	04 hrs	52	03 hrs	25	25	50	02
	OEC-1	Theory	03 hrs	42	02 hrs	40	60	100	03
	*SEC-1	Practical	03 hrs	30	02 hrs	25	25	50	02
II	DSCC2	Theory	04 hrs	56	02 hrs	40	60	100	04
		Practical	04 hrs	52	03 hrs	25	25	50	02
	OEC-2	Theory	03 hrs	42	02 hrs	40	60	100	03
Details of the other Semesters will be given later									

* Student can opt digital fluency as SEC or the SEC of his/ her any one DSCC selected

Name of Course (Subject): ZOOLOGY

Programme Specific Outcome (PSO):

On completion of the 03/ 04 years Degree in Zoology students will be able to:

PSO 1:

- 1.The structure and functions of animal cell, cell organelles, cell- cell interactions, process of reproduction leading to new organisms.
- 2.The principles of inheritance, Mendel's laws and the deviations. Inheritance of chromosomal aberrations in humans by pedigree analysis in families.
- 3.Acquaint the knowledge about basic procedure and methodology of integrated animal rearing. Students can start their own business i.e. self employments.
- 4.To get employment in different sectors of Applied Zoology.

PSO 2: .

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.

B.Sc. Semester – I

Subject: ZOOLOGY Discipline Specific Course (DSC)

The course Zoology in I semester has two papers (Theory Paper –I for 04 credits & Practical Paper -II for 2 credits) for 06 credits: Both the papers are compulsory. Details of the courses are as under.

Course No.-1 (Theory)

Course No.	Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
Course-01	DSCC	Theory	04	04	56 hrs	2hrs	40	60	100

Course No.1 (Theory): Title of the Course (Theory): **Cytology, Genetics and Infectious Diseases**

Course Outcome (CO):

After completion of course (Theory), students will be able to:

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

Syllabus- Course 1(Theory): Title- Cytology, Genetics and Infectious Diseases	Total Hrs: 56
Unit-I Structure and Function of Cell Organelles I in Animal cell	14 hrs
Plasma membrane: chemical structure—lipids and proteins Endomembrane system: protein targeting and sorting, transport, endocytosis and exocytosis Cytoskeleton: microtubules, microfilaments, intermediate filaments, Mitochondria: Structure, oxidative phosphorylation; electron transport system, Peroxisome and Ribosome: structure and function.	
Unit-II Nucleus, Chromatin Structure, Cell cycle, Cell Division and Cell Signaling	14 hrs
Structure and function of nucleus in eukaryotes, Chemical structure and base composition of DNA and RNA DNA supercoiling, chromatin organization, structure of chromosomes, Types of DNA and RNA , 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: cell adhesion molecules, cellular junctions.	

Unit-III Mendelism, Sex Determination, Extensions of Mendelism, Genes and Environment	14 hrs
Basic principles of heredity: Mendel's laws- monohybrid cross and hybrid cross, Complete and Incomplete Dominance, Penetrance and expressivity, Genetic Sex-Determining Systems, Environmental Sex Determination, Sex Determination and mechanism in <i>Drosophila melanogaster</i> . Sex-linked characteristics in humans and dosage compensation Extensions of Mendelism: Multiple Alleles, Gene Interaction. The Interaction Between Sex and Heredity: Sex-Influenced and Sex-Limited Characteristics Cytoplasmic Inheritance, Genetic Maternal Effects. Interaction between Genes and Environment: Environmental Effects on Gene Expression, Inheritance of Continuous Characteristics.	
Unit IV Human Chromosomes, Patterns of Inheritance and Infectious Diseases	14 hrs
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 Introduction to pathogenic organisms: viruses, bacteria, fungi, protozoa and Worms. Structure, life cycle, pathogenicity, including diseases, causes, symptoms and control of common parasites: <i>Trypanosoma</i> , <i>Giardia</i> and <i>Wuchereria</i> .	

Books recommended.

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

B.Sc. Semester – I

Subject: ZOOLOGY
Discipline Specific Course (DSC)

Course No.-1 (Practical)

Course No.	Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
Course-01	DSCC	Practical	02	04	52 hrs	3hrs	25	25	50

Course No.1 (Practical): Title of the Course (Practical): **Cytology, Genetics and Infectious Diseases**

Course Outcome (CO):

After completion of course (Practical), students will be able to:

- CO 1: To use simple and compound microscopes.
- CO 2: To prepare stained slides to observe the cell organelles.
- CO 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.
- CO 4: The chromosomal aberrations by preparing karyotypes.
- CO 5: How chromosomal aberrations are inherited in humans by pedigree analysis in families. The antigen-antibody reaction.

List of the Experiments for 52 hrs / Semesters

1. Understanding of simple and compound microscopes.
 2. To study different cell types such as buccal epithelial cells, neurons, striated muscle cells using 3. Methylene blue/any suitable stain (virtual/ slaughtered tissue).
 3. To study the different stages of Mitosis in root tip of *Allium cepa*.
 4. To study the different stages of Meiosis in grasshopper testis (virtual).
 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 microslides.
 7. To learn the procedures of preparation of temporary and permanent stained slides, with available mounting material.
 8. Study of mutant phenotypes of *Drosophila* sp. (from Cultures or Photographs).
 9. Preparation of polytene chromosomes (Chironomus larva or *Drosophila* 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
- <https://vlab.amrita.edu><https://sites.dartmouth.edu/>

General instructions:

1. Perform all the experiments as per the instructions in each questions.

Scheme of Practical Examination (distribution of marks): 25 marks for Semester end examination

1. Major Experiments	08 Marks
2. Minor Experiments	05 Marks
3. Identifications (A-C)	06 Marks
4. Viva	03 Marks
5. Journal	03 Marks

Total 25 marks

Note: Same Scheme may be used for IA(Formative Assessment) examination

B.Sc. Semester – I

Subject: ZOOLOGY Open Elective Course (OEC-1) (OEC for other students)

Course No.	Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
OEC-1	OEC	Theory	03	03	42 hrs	2hrs	40	60	100

OEC-1: Title of the Course: Economic Zoology

Course Outcome (CO):

After completion of course, students will be able to:

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

Syllabus- OEC: Title- Economic Zoology	Total Hrs: 42
Unit-I Sericulture, Apiculture and Aquaculture	14 hrs
<p>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>Bombyxmori</i>,Silkworm rearing techniques: Processing of cocoon, reeling,Silkworm diseases and pest control</p> <p>Introduction and present status of apiculture,Species of honey bees in India, life cycle of <i>Apisindica</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</p> <p>Aquaculture in India: An overview and present status and scope of aquaculture, Types of</p>	

<p>aquaculture: Pond culture: Construction, maintenance and management; carp culture, shrimp culture, shellfish culture, composite fish culture and pearl culture</p>	
<p>Unit-II Live Stock Management: Dairy, Poultry. And Vermiculture</p>	<p>14 hrs</p>
<p>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 Types of breeds and their rearing methods, Feed formulations for chicks, Nutritive value of egg and meat, Disease of poultry and control measures 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>	
<p>Unit-III Fish culture, Prawn culture and Lac Culture</p>	<p>14 hrs</p>
<p>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. Culture of fresh and marine water prawns. Preparation of farm. Preservation and processing of prawn, export of prawn. 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,</p>	

propagation of lac insect, inoculation period, harvesting of lac.Lac composition, processing, products, uses and their pests.	
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Books recommended.

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

B.Sc. Semester - I

Subject: ZOOLOGY SKILL ENHANCEMENT COURSE (SEC)-I

Title of Paper : VERMICULTURE

Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours / Semester	Mode of Examination	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
SEC-I	Theory + Practical	02	03hrs	30	Practical	2hr	25	25	50

Course Outcome (CO):

After completion of Skill Enhancement course, students will be able to:

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

List of the Experiments for 52 hrs / Semesters

1. **INSTRUCTIONS FOR ALL THE EXPERIMENTS** : Biology and life cycle of earthworm, Types of earthworms. Establishment of vermiculture unit, Preparation of bed, inoculation , composting process, harvesting of vermicompost and worms, Economic importance of vermicompost, vermiwash, vermi-protein. Natural enemies of earthworms and their control measures
- 2.Visit to vermiculture farm to acquaint latest field techniques
- 3.Collection of native earthworm species to study habit and habitat.
- 4.Keys to identify different species of earthworms
- 5.Study of vermicomposting equipment and devices.
- 6.Preparation of vermibeds and their maintenance
7. Study of different vermicomposting methods.
- 8.Harvesting of compost and separation of worms,
9. Establishment of vermiwash unit,
- 10.Packaging, transport and storage of varmicompost.
11. Worm meal preparation, preservation and packing
12. Physico-chemical and estimation of vermicompost , vermiwash and vermi protein

General instructions:Perform all the experiments as per the instructions in each questions.

Scheme of Practical Examination (distribution of marks): 25 marks for Semester end examination

- | | |
|--------------------------|----------|
| 1. Major Experiments | 08 Marks |
| 2. Minor Experiments | 05 Marks |
| 3. Identifications (A-C) | 06 Marks |
| 4. Viva | 03 Marks |
| 5. Journal | 03 Marks |

Total 25 marks

Note: Same Scheme may be used for IA(Formative Assessment) examination

Books recommended.

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

Details of Formative assessment (IA) for DSCC theory/OEC: 40% weight age for total marks

Type of Assessment	Weight age	Duration	Commencement
Written test-1	10%	1 hr	8 th Week
Written test-2	10%	1 hr	12 th Week
Seminar	10%	10 minutes	--
Case study / Assignment / Field work / Project work/ Activity	10%	-----	--
Total	40% of the maximum marks allotted for the paper		

Faculty of Science
04 - Year UG Honors programme:2021-22
GENERAL PATTERN OF THEORY QUESTION PAPER FOR DSCC/ OEC
(60 marks for semester end Examination with 2 hrs duration)

Part-A

1. Question number 1-06 carries 2 marks each. Answer any 05 questions : 10marks

Part-B

2. Question number 07- 11 carries 05Marks each. Answer any 04 questions : 20 marks

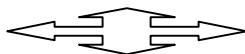
Part-C

3. Question number 12-15 carries 10 Marks each. Answer any 03 questions : 30 marks

(Minimum 1 question from each unit and 10 marks question may have sub questions for 7+3 or 6+4 or 5+5 if necessary)

Total: 60 Marks

Note: Proportionate weight age shall be given to each unit based on number of hours prescribed.



B.Sc. Semester – II

Subject: ZOOLOGY
Discipline Specific Course (DSC)

The course Zoology in I semester has two papers (Theory Paper –I for 04 credits & Practical paper-II for 2 credits) for 06 credits: Both the papers are compulsory. Details of the courses are as under.

Course No.-2 (Theory)

Course No.	Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
Course-02	DSCC	Theory	04	04	56 hrs	2hrs	40	60	100

Course No.2 (Theory): Title of the Course (Theory) : Biochemistry and Physiology

Course Outcome (CO):

After completion of course (Theory), students will be able to:

- CO 1:To develop a deep understanding of structure of biomolecules like proteins, lipids and carbohydrates.
- CO 2:How simple molecules together form complex macromolecules.
- CO 3:To understand the thermodynamics of enzyme catalyzed reactions.
- CO 4:Mechanisms of energy production at cellular and molecular levels.
- CO 5:To understand various functional components of an organism.
- CO 6:To explore the complex network of these functional components.
- CO 7:To comprehend the regulatory mechanisms for maintenance of function in the body.

Syllabus- Course 2(Theory): Title- Biochemistry and Physiology	Total Hrs: 56
Unit-I Structure, Function of Biomolecules,Enzyme Action and Regulation	14 hrs
Nomenclature and classification of enzymes; Cofactors; pecificity of enzyme action.Structure and Biological importance of carbohydrates (Monosaccharides, Disaccharides, Polysaccharides and Glycoconjugates). Lipids (saturated and unsaturated Fatty acids, Tri-acylglycerols, Phospho lipids, Glycolipids and Steroids)Structure, Classification and General Properties of a-amino acids; Essential and non-essential amino acids, Levels of organization in proteins; Simple and conjugate proteins. Isozymes; Mechanism of enzyme action,Enzyme kinetics; Factors affecting rate of enzyme-catalyzed reactions ; Equation of Michaela’s – Mendon, Concept of Km and V max, Enzyme inhibition,Allosteric enzymes and their kinetics; Regulation of enzyme action.	

Unit-II Metabolism of Carbohydrates, Lipids Metabolism, Proteins and Nucleotides	14 hrs
<p>Metabolism of Carbohydrates: glycolysis, citric acid cycle, gluconeogenesis, phosphate pentose pathway Glycogenolysis and Glycogenesis</p> <p>Lipids- Biosynthesis of palmitic acid; Ketogenesis, β-oxidation and ω-oxidation of saturated fatty acids with even and odd number of carbon atoms</p> <p>Catabolism of amino acids: Transamination, Deamination, Urea cycle, Nucleotides and vitamins, Peptide linkages.</p>	
Unit-III Digestion, Respiration, Circulation and Excretion in humans	14 hrs
<p>Structural organization and functions of gastrointestinal tract and associated glands. Mechanical and chemical digestion of food; Absorption of carbohydrates, lipids, proteins, water, minerals and vitamins; Physiology of trachea and Lung.</p> <p>Mechanism of respiration, Pulmonary ventilation; Respiratory volumes and capacities; Transport of oxygen and carbon dioxide in blood, Respiratory pigments, Dissociation curves and the factors influencing it; Control of respiration.</p> <p>Components of blood and their functions; hemopoiesis, Blood clotting: Blood clotting system, Blood groups: Rh-factor, ABO and MN, Structure of mammalian heart, Cardiac cycle; Cardiac output and its regulation, Electrocardiogram, Blood pressure and its regulation, Structure of kidney and its functional unit; Mechanism of urine formation.</p>	
Unit-IV Nervous System, Endocrinology and Muscular System in humans	14 hrs
<p>Structure of neuron, resting membrane potential (RMP), Origin of action potential and its propagation across the myelinated and unmyelinated nerve fibers. Types of synapse</p> <p>Endocrine glands - pineal, pituitary, thyroid, parathyroid, pancreas and adrenal; hormones secreted by them. Classification of hormones; Mechanism of Hormone action.</p> <p>Histology of different types of muscle; Ultra structure of skeletal muscle; Molecular and chemical basis of muscle contraction; Characteristics of muscle twitch; Motor unit, summation and tetanus</p>	

Books recommended.

1. Nelson & Cox: Leininger's Principles of Biochemistry: McMillan (2000)
2. Zubay et al: Principles of Biochemistry: WCB (1995)
3. Voet&Voet: Biochemistry Vols I & 2: Wiley (2004)
4. Murray et al: Harper's Illustrated Biochemistry: McGraw Hill (2003) Elliott and Elliott: Biochemistry and Molecular Biology: Oxford University Press
5. Guyton, A.C. & Hall, J.E. Textbook of Medical Physiology, XI Edition, Hercourt Asia PTE Ltd. /W.B.Saunders Company. (2006).
6. Tortora, G.J. &Grabowski, S. Principles of Anatomy & Physiology. XI Edition John Wiley & sons (2006).
7. Christopher D. Moyes, Patricia M. Schulte. Principles of Animal Physiology. 3rd Edition, Pearson Education (2016).
8. Hill, Richard W., et al. Animal physiology. Vol. 2. Sunderland, MA: Sinauer Associates, (2004).
9. Chatterjee CC Human Physiology Volume I & 2, 11th edition, CBS Publishers (2016).

B.Sc. Semester – II

Subject: ZOOLOGY Discipline Specific Course (DSC)

Course No.-2 (Practical)

Course No.	Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
Course-02	DSCC	Practical	02	04	52 hrs	3hrs	25	25	50

Course No.2 (Practical): Title of the Course (Practical) : Biochemistry and Physiology

Course Outcome (CO):

After completion of course (Practical), students will be able to:

CO 1:At the end of the course the student should be able to understand Basic structure of biomolecules through model making.

CO 2:Develop the skills to identify different types of blood cells.

CO 3:Enhance basic laboratory skill like keen observation, analysis and discussion. Learn the functional attributes of biomolecules in animal body.

CO 4:Know uniqueness of enzymes in animal body and their importance through enzyme kinetics.

List of the Experiments for 52 hrs / Semesters

1. Preparation of models of nitrogenous bases- nucleosides and nucleotides.
2. Preparation of models of amino acids and dipeptides.
3. Preparation of models of DNA and RNA.
4. Qualitative analysis of Carbohydrates, Proteins and Lipids.
5. Qualitative analysis of Nitrogenous wastes – Ammonia, Urea and Uric acid.
6. Separation of amino acids or proteins by paper chromatography.
7. Determination of the activity of enzyme (Urease)-Effect of [S] and determination of Km and Vmax.
8. Determination of the activity of enzyme (Urease) - Effect of temperature and time.
9. Action of salivary amylase under optimum conditions.
10. Quantitative estimation of Oxygen consumption by fresh water Crab.
11. Quantitative estimation of salt gain and salt loss by fresh water.
12. Estimation of Hemoglobin in human blood using Sahli's haemoglobinometer.
13. Counting of RBC in blood using Hemocytometer.
14. Counting of WBC in blood using Hemocytometer.
15. Differential staining of human blood corpuscles using Leishman stain.
16. Recording of blood glucose level by using glucometer.

Virtual Labs (Suggestive sites)

<https://www.vlab.co.in>

<https://zoologysan.blogspot.com> www.vlab.iitb.ac.in/vlab

www.onlinelabs.in www.powershow.com <https://vlab.amrita.edu>

<https://sites.dartmouth.edu>

General instructions:

1. Perform all the experiments as per the instructions in each questions.

Scheme of Practical Examination (distribution of marks): 25 marks for Semester end examination.

1. Major Experiments	08 Marks
2. Minor Experiments	05 Marks
3. Identifications (A-C)	06 Marks
4. Viva	03 Marks
5. Journal	03 Marks

Total 25 marks

Note: Same Scheme may be used for IA(Formative Assessment) examination

Books recommended.

1. Nelson & Cox: Leininger's Principles of Biochemistry: McMillan (2000)
2. Zubay et al: Principles of Biochemistry: WCB (1995)
3. Voet&Voet: Biochemistry Vols I & 2: Wiley (2004)
4. Murray et al: Harper's Illustrated Biochemistry: McGraw Hill (2003)
Elliott and Elliott: Biochemistry and Molecular Biology: Oxford University Press
5. Guyton, A.C. & Hall, J.E. Textbook of Medical Physiology, XI Edition, Hercourt Asia PTE Ltd. /W.B.Saunders Company. (2006).
6. Tortora, G.J. &Grabowski, S. Principles of Anatomy & Physiology. XI Edition John Wiley & sons (2006).
7. Christopher D. Moyes, Patricia M. Schulte. Principles of Animal Physiology. 3rd Edition, Pearson Education (2016).
8. Hill, Richard W., et al. Anima I physiology. Vol. 2. Sunderland, MA: Sinauer Associates, (2004).
9. Chatterjee CC Human Physiology Volume I & 2, 11th edition, CBS Publishers (2016).

B.Sc. Semester – II

Subject: ZOOLOGY Open Elective Course (OEC-2) (OEC for other students)

Course No.	Type of Course	Theory / Practical	Credits	Instruction hour per week	Total No. of Lectures/Hours / Semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
OEC-2	OEC	Theory	03	03	42 hrs	2hrs	40	60	100

OEC-2: Title of the Course: Parasitology

Course Outcome (CO):

After completion of course, students will be able to:

- CO 1: Know the stages of the life cycles of the parasites and infective stages.
- CO 2: Develop ecological model to know population dynamics of parasite, establishment of parasite population in host body, adaptive radiations and methods adopted by parasite to combat with the host immune system.
- CO 3: Develop skills and realize significance of diagnosis of parasitic infection and treatment.
- CO 4: Understand about diseases caused by Protozoa, Helminthes, Nematodes and Arthropods at molecular level.
- CO 5: Develop their future career in medical sciences and related administrative services.

Syllabus- OEC: Title- Parasitology	Total Hrs: 42
Unit-I General Concepts Parasitic Platyhelminthes and Parasitic Protists	14 hrs
Introduction, Parasites, parasitoids, host, zoonosis, Origin and evolution of parasites, Basic concept of Parasitism, symbiosis, phoresis, commensalisms and mutualism, Host-parasite interactions and adaptations, Life cycle of human parasites, Occurrence, mode of infection and prophylaxis Study of morphology, life cycle, pathogenicity, prophylaxis and control measures of <i>Fasciolopsis buski</i> , <i>Schistosoma haematobium</i> , <i>Taenia solium</i> , <i>Hymenolepis nana</i> Study of morphology, life cycle, pathogenicity, prophylaxis and control measures of, <i>Entamoeba histolytica</i> , <i>Giardia intestinalis</i> , <i>Trypanosoma gambiense</i> , <i>Plasmodium vivax</i> .	
Unit-II Parasitic Nematodes, Arthropods and Vertebrates	14 hrs
Study of morphology, life cycle, pathogenicity, prophylaxis and control measures of <i>Ascaris lumbricoides</i> , <i>Ancylostoma duodenale</i> , <i>Wuchereria bancrofti</i> , <i>Trichinella spiralis</i> , Nematode plant interaction ; Gall formation Biology, importance and control of Ticks (Soft tick <i>Ornithodoros</i> , Hard tick <i>Ixodes</i>), Mites (<i>Sarcoptes</i>), Lice (<i>Pediculus</i>), Flea (<i>Xenopsylla</i>), Bug (<i>Cimex</i>), Parasitoid (Beetles) Cookicutter Shark, Hood Mocking bird and Vampire bat and their parasitic behavior and effect on host.	

Unit-III Molecular diagnosis and clinical parasitology	14 hrs
General concept of molecular diagnosis for parasitic infection, Advantages and disadvantages of molecular diagnosis Fundamental techniques used in molecular diagnosis of endoparasites Immunoassay or serological techniques for laboratory diagnosis of endoparasites on the basis of marker molecules like <i>G.intestinalis</i> , <i>B. coli</i> , <i>E. histolytica</i> , <i>L.donovani</i> , Malaria parasite using ELISA, RIA, Counter Current Immunoelectrophoresis (CCI), Complement Fixation Test (CFT) PCR, DNA, RNA probe.	

Books recommended.

1. Arora, D. R and Arora, B. (2001) Medical Parasitology. II Edition. CBS Publications and Distributors.
2. E.R. Noble and G.A. Noble (1982) Parasitology: The biology of animal parasites. V Edition, Lea &Febiger.
3. Ahmed, N., Dawson, M., Smith, C. and Wood, Ed. (2007) Biology of Disease. Taylor and Francis Group.
4. Parija, S. C. Textbook of medical parasitology, protozoology & helminthology (Text and colour Atlas), II Edition, All India Publishers & Distributers, Medical Books Publishers, Chennai, Delhi.
5. Meyer, Olsen & Schmidt's Essentials of Parasitology, Murray, D. Dailey, W.C. Brown Publishers.
6. K. D. Chatterjee (2009). Parasitology: Protozoology and Helminthology. XIII Edition, CBS Publishers & Distributors (P) Ltd.
7. Gunn, A. and Pitt, S.J. (2012). Parasitology: an Integrated Approach. Wiley Blackwell.
8. Noble, E. R. and G.A.Noble (1982) Parasitology: The biology of animal parasites. V th Edition, Lea &Febiger.
9. Paniker, C.K.J., Ghosh, S. [Ed] (2013). Paniker's Text Book of Medical Parasitology. Jaypee, New Delhi.
10. Parija, S.C. Textbook of medical parasitology, protozoology & helminthology (Text and color Atlas), II Edition, All India Publishers & Distributers, Medical Books Publishers, Chennai, Delhi.
11. Roberts, L.S and Janovy, J. (2009). Smith & Robert's Foundation of Parasitology. 8th. Edn. McGraw Hill.
12. Bogitsh, B. J. and Cheng, T. C. (2000). Human Parasitology. 2nd Ed. Academic Press, New York.
13. Chandler, A. C. and Read. C. P. (1961). Introduction to Parasitology, 10th ed. John Wiley and Sons Inc.
14. Cheng, T. C. (1986). General Parasitology. 2nd ed. Academic Press, Inc. Orlando. U.S.A.
15. Schmidt, G. D. and Roberts, L. S. (2001). Foundation of Parasitology. 3rd ed. McGraw Hill Publishers.
16. Schmidt, G. D. (1989). Essentials of Parasitology. Wm. C. Brown Publishers (Indian print 1990, Universal Book Stall).
17. John Hyde (1996) Molecular Parasitology Open University Press.
18. J Joseph Marr and Miklos Muller (1995) Biochemistry and Molecular Biology of Parasites 2nd Edn Academic Press.

Details of Formative assessment (IA) for DSCC theory/OEC: 40% weight age for total marks

Type of Assessment	Weight age	Duration	Commencement
Written test-1	10%	1 hr	8 th Week
Written test-2	10%	1 hr	12 th Week
Seminar	10%	10 minutes	--
Case study / Assignment / Field work / Project work/ Activity	10%	-----	--
Total	40% of the maximum marks allotted for the paper		

Faculty of Science
04 - Year UG Honors programme:2021-22

GENERAL PATTERN OF THEORY QUESTION PAPER FOR DSCC/ OEC
(60 marks for semester end Examination with 2 hrs duration)

Part-A

1. Question number 1-06 carries 2 marks each. Answer any 05 questions : 10marks

Part-B

2. Question number 07- 11 carries 05Marks each. Answer any 04 questions : 20 marks

Part-C

3. Question number 12-15 carries 10 Marks each. Answer any 03 questions : 30 marks

(Minimum 1 question from each unit and 10 marks question may have sub questions for 7+3 or 6+4 or 5+5 if necessary)

Total: 60 Marks

Note: Proportionate weight age shall be given to each unit based on number of hours prescribed.

