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/ 954 Date: 30 SEP 2021

ಅಧಿಸೂಚನೆ

ವಿಷಯ: 2021–22ನೇ ಶೈಕ್ಷಣಿಕ ಸಾಲಿನಿಂದ ಎಲ್ಲ ಸ್ನಾತಕ ಕೋರ್ಸಗಳಿಗೆ 1 ಮತ್ತು 2ನೇ ಸೆಮೆಸ್ಟರ್ 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 ಸಂಖ್ಯೆ ಇಡಿ 260 ಯುಎನ್ಇ 2019(ಭಾಗ–1), ಬೆಂಗಳೂರು ದಿನಾಂಕ: 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. ಮಾನ್ಯ ಕುಲಪತಿಗಳ ಆದೇಶ ದಿನಾಂಕ: 30.09.2021

ಮೇಲ್ಕಾಣಿಸಿದ ವಿಷಯ ಹಾಗೂ ಉಲ್ಲೇಖಗಳನ್ವಯ ಮಾನ್ಯ ಕುಲಪತಿಗಳ ಆದೇಶದ ಮೇರೆಗೆ, 2021–22ನೇ ಶೈಕ್ಷಣಿಕ ಸಾಲಿನಿಂದ ಅನ್ವಯವಾಗುವಂತೆ, ಎಲ್ಲ B.A./ BPA (Music)/BVA/ BTTM/ 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 ಕೋರ್ಸಗಳ 1 ಮತ್ತು 2ನೇ ಸೆಮೆಸ್ಟರ್‌ಗಳಿಗೆ NEP-2020 ರಂತೆ ವಿಶೇಷ ವಿದ್ಯಾವಿಷಯಕ ಪರಿಷತ್ ಸಭೆಯ ಅನುಮೋದಿತ ಕೋರ್ಸಿನ ಪಠ್ಯಕ್ರಮಗಳನ್ನು ಕ.ವಿ.ವಿ. ಅಂತರ್ಜಾಲ www.kud.ac.in ದಲ್ಲಿ ಭಿತ್ತರಿಸಲಾಗಿದೆ. ಸದರ ಪಠ್ಯಕ್ರಮಗಳನ್ನು ಕ.ವಿ.ವಿ. ಅಂತರ್ಜಾಲದಿಂದ ಡೌನಲೋಡ ಮಾಡಿಕೊಳ್ಳಲು ಸೂಚಿಸುತ್ತ ವಿದ್ಯಾರ್ಥಿಗಳ ಹಾಗೂ ಸಂಬಂಧಿಸಿದ ಎಲ್ಲ ಬೋಧಕರ ಗಮನಕ್ಕೆ ತಂದು ಅದರಂತೆ ಕಾರ್ಯಪ್ರವೃತ್ತರಾಗಲು ಕವಿವಿ ಅಧೀನದ/ಸಂಲಗ್ನ ಮಹಾವಿದ್ಯಾಲಯಗಳ ಪ್ರಾಚಾರ್ಯರುಗಳಿಗೆ ಸೂಚಿಸಲಾಗಿದೆ.

ಅಡಕ: ಮೇಲಿನಂತೆ

30/09/21

(ಡಾ. ಹನುಮಂತಪ್ಪ ಕೆ.ಟಿ.)
ಕುಲಸಚಿವರು.

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

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.ಪಿಎಚ್.ಡಿ) ವಿಭಾಗ, ಸಂಬಂಧಿಸಿದ ಕೋರ್ಸುಗಳ ವಿಭಾಗಗಳು ಪರೀಕ್ಷಾ ವಿಭಾಗ, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ.
5. ನಿರ್ದೇಶಕರು, ಕಾಲೇಜು ಅಭಿವೃದ್ಧಿ / ವಿದ್ಯಾರ್ಥಿ ಕಲ್ಯಾಣ ವಿಭಾಗ, ಕ.ವಿ.ವಿ. ಧಾರವಾಡ.

KARNATAK UNIVERSITY, DHARWAD

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

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SYLLABUS

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	Internal Assessment Marks	Sem End Exam. Marks	Total Marks	Credits
I	DSCC-1T	Theory	04 hrs	56	03 hrs	30	70	100	04
	DSCC-1P	Practical	04 hrs	52	03 hrs	15	35	50	02
	OEC-1	Theory	03 hrs	42	03 hrs	30	70	100	03
	*SEC-1	Practical	02 hrs	22-30	03 hrs	15	35	50	02
II	DSCC-2T	Theory	04 hrs	56	03 hrs	30	70	100	04
	DSCC-2P	Practical	04 hrs	52	03 hrs	15	35	50	02
	OEC-2	Theory	03 hrs	42	03 hrs	30	70	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 it will be evaluated as pr the guidelines issued by the University time to time.**

Karnatak University, Dharwad

Four Years Under Graduate Program in Zoology for B.Sc. (Hons.) as per NEP-2020

Effective from 2021-22

Sem	Subject Code	Theory/ Practical	Teaching hour per week	Total Teaching hours	Formative Assessment Marks (IA)	Summative Assessment Marks (Sem end)	Total Marks	Duration of Exam (Hrs)	Credits
I	ZOOLDSCT1	Theory	4	56	30	70	100	3hrs	4
	ZOOLDSCP1	Practical	4	52	15	35	50	3hrs	2
	ZOOL OEC1	Theory	3	42	30	70	100	3hrs	3
	ZOOLSEC1	Theory	1	10	15	35	50	3hrs	2
		Practical	2	20					
II	ZOOLDSCT2	Theory	4	56	30	70	100	3hrs	4
	ZOOLDSCP2	Practical	4	52	15	35	50	3hrs	2
	ZOOL OEC2	Theory	3	42	30	70	100	3hrs	3

B.Sc. I- Semester
Zoology :Discipline Specific Course (DSC)

Course	No of Teaching hrs per week	Total No of Teaching hrs	Formative Assessment Marks (IA)	Summative Assessment Marks (Sem end)	Total Marls	Exam duration (Hrs)	Credits
Theory	4	56	30	70	100	3hrs	04
Practical	4	52	15	35	50	3hrs	02

Course Title : Cytology, Genetics and Infectious Diseases

Content	Hours
Unit I Structure and Function of Cell Organelles I in Animal cell	**14**
Chapter 1. Plasma membrane: chemical structure—lipids and proteins **Chapter 2** Endomembrane system: protein targeting and sorting, transport, endocytosis and exocytosis **Chapter 3** Cytoskeleton: microtubules, microfilaments, intermediate filaments, Mitochondria: Structure, oxidative phosphorylation; electron transport system, Peroxisome and Ribosome: structure and function	
Unit II Nucleus, Chromatin Structure, Cellcycle,Cell Division and Cell Signaling	**14**
Chapter 1 Structure and function of nucleus in eukaryotes,Chemical structure and base composition of DNA and RNA **Chapter 2** DNA supercoiling, chromatin organization, structure of chromosomes,Types of DNA and RNA ,Cell division: mitosis and meiosis **Chapter 3**Introduction to Cell cycle and its regulation, apoptosis,Signal Transduction: intracellular 11 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**
Chapter 1 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 *Drosophila melanogaster*.Sex-linked characteristics in humans and dosage compensation **Chapter 2.** Extensions of Mendelism: Multiple Alleles, Gene Interaction.The Interaction Between Sex and Heredity: Sex-Influenced and Sex-Limited Characteristics **Chapter 3** 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**
Chapter 1. Patterns of inheritance: autosomal dominance, autosomal recessive, X-linked recessive, X-linked dominant. **Chapter 2** Chromosomal anomalies: Structural and numerical aberrations with examples.Human karyotyping and Pedigree analysis **Chapter 3** Introduction to pathogenic organisms: viruses, bacteria, fungi, protozoa and worms.Structure, life cycle, pathogenicity, including diseases, causes, symptoms and control of common parasites: *Trypanosoma,Giardia and Wuchereria*.	

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 HFreeman (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 / TermPapers/Seminar

Formative Assessment	
Assessment Occasion	Weightage in Marks
House Examination/Test 1	10
Test 2	10
Written Assignment/Presentation/Project / Term Papers/Seminar	10
Total	30

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 organisms.
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.

List of labs to be conducted	52 hours.
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 beingstudied 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 17. https://vlab.amrita.eduhttps://sites.dartmouth.edu/	

Open Elective Course Content

Course Title: Economic Zoology

Course ZOOLOEC1	No of Teaching hrs per week	Total No. of Teaching hrs	Formative Assessment Marks (IA)	Summative Assessment Marks (Sem end)	Total Marls	Exam duration (hrs)	Credits
Theory	3	42	30	70	100	3hrs	03

Course Title : Economic Zoology

Content	Hrs
Unit I. Sericulture, Apiculture and Aquaculture	**14**
Chapter 1: History and present status of sericulture in India, Mulberry and non-mulberry species in Karnataka and India, Mulberry cultivation, Morphology and life cycle of *Bombyxmori*, Silkworm rearing techniques: Processing of cocoon, reeling, Silkworm diseases and pest control **Chapter 2.:** Introduction and present status of apiculture, Species of honey bees in India, life cycle of *Apisindica*, 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 **Chapter 3.:** 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 II Live Stock Management: Dairy, Poultry. And Vermiculture	**14**
Chapter 1.: 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 **Chapter 2:** Types of breeds and their rearing methods, Feed formulations for chicks, Nutritive value of egg and meat, Disease of poultry and control measures **Chapter 3:** 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.	
Unit - 3 Fish culture, Prawn culture and Lac Culture	**14**
Chapter 1.: 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 **Chapter 2.:** Culture of fresh and marine water prawns. Preparation of farm. Preservation and processing of prawn, export of prawn. **Chapter 3:** 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. YadavManju (2003). Economic Zoology, Discovery Publishing House.
9. JabdePradip 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.1 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 Outcomes (COs):

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 lac cultivation.
7. Students can start their own business i.e. self-employments.
8. Get employment in different applied sectors

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

Formative Assessment	
Assessment Occasion	Weightage in Marks
House Examination/Test 1	10
Test 2	10
Written Assignment/Presentation/Project / Term Papers/Seminar	10
Total	30

B.SC I- SEMESTER
ZOOLOGY: SKILL ENHANCEMENT COURSE(SEC)

Course ZOOLSEC1	No of Teaching hrs per week	Total No of Teaching hrs	Formative Assessment Marks (IA)	Summative Assessment Marks (Sem end)	Total Marls	Exam duration	Credits
Theory	1	10	15	35	50	3 hrs	02
Practical	2	20					

ZOOLSEC1: VERMICULTURE:

Contents	Hrs
Theory:	**10**
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.	
Practicals	**20**
Visit to vermiculture farm to acquaint latest field techniques	
1.Collection of native earthworm species to study habit and habitat.	
2.Keys to identify different species of earthworms	
3.Study of vermicomposting equipment and devices.	
4.Preparation of vermibeds and their maintenance	
5. Study of different vermicomposting methods.	
6.Harvesting of compost and separation of worms,	
7. Establishment of vermiwash unit,	
8.Packaging, transport and storage of varmicompost.	
9. Worm meal preparation, preservation and packing	
10. Physico-chemical and estimation of vermicompost , vermiwash and vermi protein	

Recommended Books:

- Bhatt J.V. &S.R. Khambata (1959)-Role ofEarthworms in Agriculture Indian Council of Agricultural Research, New Delhi
- Edwards, C.A. and J.R. Lofty(1977) -BiologyofEarthworms Chapmanand Hall Ltd.,London.
- Lee, K.E. (1985) -Earthworms:Their ecologyand Relationship with Soilsand Land Use Academic Press, Sydney.
- 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.
- Kevin,AandK.E.Lee(1989)—EarthwormforGardenersandFisherman (CSIRO,Australia, Division ofSoils)
- Satchel, J.E. (1983)-Earthworm Ecology Chapman Hall,London.
- Wallwork, J.A. (1983)-EarthwormBiology Edward Arnold(Publishers)Ltd. London

Course Outcomes (COs):

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

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.

B.Sc II- Semester
ZOOLOGY: Discipline Specific Course (DSC)

Course	No of Teaching hrs per week	Total No of Teaching hrs	Formative Assessment Marks (IA)	Summative Assessment Marks (Sem end)	Total Marls	Exam duration (hrs)	Credits
Theory	4	56	30	70	100	3	04
Practical	4	52	15	35	50	3	02

Course Title: Biochemistry and Physiology

Content	Hours
Unit I Structure, Function of Biomolecules,Enzyme Action and Regulation	**14**
Chapter 1. Nomenclature and classification of enzymes; Cofactors; pecificity of enzyme action.Structure and Biological importance of carbohydrates (Monosaccharides, Disaccharides, Polysaccharides and Glycoconjugates). **Chapter 2.**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. **Chapter 3.** 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 2 Metabolism of Carbohydrates, Lipids Metabolism, Proteins and Nucleotides	**14**
Chapter 1. Metabolism of Carbohydrates: glycolysis, citricacid cycle, gluconeogenesis, phosphate pentose pathway Glycogenolysis and Glycogenesis **Chapter 2.**Lipids- Biosynthesis of palmiticacid; Ketogenesis,β-oxidation and omega -oxidation of saturated fatty acids with even and odd number of carbonatoms **Chapter 3.** Catabolism of amino acids: Transamination, Deamination, Ureacycle, Nucleotides and vitamins**,**Peptide linkages**.**	

Unit 3 Digestion, Respiration, Circulation and Excretion in humans	14
Chapter 1. Structural organization and functions of gastrointestinal tract and associated glands.Mechanical and chemical digestion of food; Absorptions of carbohydrates, lipids, proteins, water, minerals and vitamins; Physiology of trachea and Lung. **Chapter 2** 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. **Chapter 3** 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.	
Unit IV Nervous System,Endocrinology and Muscular System in humans	**14**
Chapter 1. Structure of neuron, resting membrane potential(RMP)**,**Origin of action potential and its propagation across the myelinated and unmyelinated nerve fibers. Types of synapse **Chapter 2** Endocrine glands - pineal, pituitary, thyroid, parathyroid, pancreas and adrenal; hormones secreted by them.Classification of hormones; Mechanism of Hormone action. **Chapter 3** 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	

Suggested Readings:

I. Nelson & Cox: Leininger‘s Principles of Biochemistry: McMillan (2000)

2. Zubay et al: Principles of Biochemistry: WCB (1995)

3. Voet&Voet: Biochemistry Vols l & 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, Xl 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 l physiology. Vol. 2. Sunderland, MA: Sinauer Associates, (2004).

9. Chatterjee CC Human Physiology Volume l & 2, 11th edition, CBS Publishers (20 I 6).

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

Formative Assessment	
Assessment Occasion	Weightage in Marks
House Examination/Test 1	10
Test 2	10
Written Assignment/Presentation/Project / Term Papers/Seminar	10
Total	30

Course outcomes:

The student at the completion of the course will learn:

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

Semester II

Zoology Core Course Lab Content

List of labs to be conducted	Hours
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.	52
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 optimumconditions. 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'shaemoglobinometer. 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.inwww.powershow.com https://vlab.amrita.edu https://sites.dartmouth.edu	

Text Books

1. Nelson & Cox: Leininger‘s Principles of Biochemistry: McMillan (2000)
2. Zubay et al: Principles of Biochemistry: WCB (1995)
3. Voet&Voet: Biochemistry Vols l & 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, Xl 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 l physiology. Vol. 2. Sunderland, MA: Sinauer Associates, (2004).
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Open Elective Course Content

Course ZOOLOEC1	No of Teaching hrs per week	Total No. of Teaching hrs	Formative Assessment Marks (IA)	Summative Assessment Marks (Sem end)	Total Marls	Exam duration (hrs)	Credits
Theory	3	42	30	70	100	3hrs	03

Course Title : Parasitology

Content	42Hrs
Unit – 1 General Concepts Parasitic Platyhelminthes and Parasitic Protists	
Chapter 1. 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**,**Occurance, mode of infection and prophylaxis **Chapter 2.** Study of morphology, life cycle, pathogenicity, prophylaxis and control measures of *Fasciolopsisbuski**,Schistosomahaematobium**,Taeniasolium**,Hymenolepis nana* **Chapter 3** Study of morphology, life cycle, pathogenicity, prophylaxis and control *measures* of**,***Entamoebahistolytica**,Giardia intestinalis, Trypanosomagambiense,Plasmodium vivax*	**14**
Unit – 2 Parasitic Nematodes, Arthropods and Vertebrates	**14**
Chapter 1. Study of morphology, life cycle, pathogenicity, prophylaxis and control measures of *Ascarislumbricoides,Ancylostomaduodenale,Wuchereriabancrofti,Trichinellaspiralis*, Nematode plant interaction ; Gall formation **Chapter 2.** Biology, importance and control of Ticks (Soft tick *Ornithodoros*, Hard tick *Ixodes*)**,**Mites(*Sarcoptes*)**,**Lice (*Pediculus*)**,**Flea (*Xenopsylla*)**,**Bug (*Cimex*)**,**Parasitoid (Beetles) **Chapter 3.** Cookicutter Shark**,**Hood Mocking bird and Vampire bat and their parasitic behavior and effect on host	
Unit – 3 Molecular diagnosis and clinical parasitology	**14**
Chapter 1. General concept of molecular diagnosis for parasitic infection**,**Advantages and disadvantages of molecular diagnosis **Chapter 2.**Fundamental techniques used in molecular diagnosis of endoparasites **Chapter 3.**Immunoassay or serological techniques for laboratory diagnosis of endoparasites on the basis of marker molecules like G.intestinalis, B. coli, E. histolytica, L. donovani, Malarial parasite using ELISA, RIA,Counter Current Immunoelectrophoresis (CCI),Complement Fixation Test (CFT) PCR, DNA, RNA probe	

Suggested Readings:

19. Arora, D. R and Arora, B. (2001) Medical Parasitology. II Edition. CBS Publications and Distributors.
20. E.R. Noble and G.A. Noble (1982) Parasitology: The biology of animal parasites. V Edition, Lea &Febiger.
21. Ahmed, N., Dawson, M., Smith, C. and Wood, Ed. (2007) Biology of Disease. Taylor and Francis Group.
22. Parija, S. C. Textbook of medical parasitology, protozoology & helminthology (Text and colour Atlas), II Edition, All India Publishers & Distributers, Medical Books Publishers, Chennai, Delhi.
23. Meyer, Olsen & Schmidt's Essentials of Parasitology, Murray, D. Dailey, W.C. Brown Publishers.
24. K. D. Chatterjee (2009). Parasitology: Protozoology and Helminthology. XIII Edition, CBS Publishers & Distributors (P) Ltd.
25. Gunn, A. and Pitt, S.J. (2012). Parasitology: an Integrated Approach. Wiley Blackwell.
26. Noble, E. R. and G.A.Noble (1982) Parasitology: The biology of animal parasites. V th Edition, Lea &Febiger.
27. Paniker, C.K.J., Ghosh, S. [Ed} (2013). Paniker's Text Book of Medical Parasitology. Jaypee, New Delhi.
28. Parija,S.C.Textbookofmedicalparasitology,protozoology&helminthology(Textand color Atlas),II Edition, All India Publishers & Distributers, Medical Books Publishers, Chennai, Delhi.
29. Roberts, L.S and Janovy, J. (2009). Smith & Robert's Foundation ofParasitology. 8th. Edn. McGraw Hill.
30. Bogitsh, B. J. and Cheng, T. C. (2000). Human Parasitology. 2nd Ed. Academic Press, New York.
31. Chandler, A. C. and Read. C. P. (1961). Introduction to Parasitology, 10th ed. John Wiley andSons Inc.
32. Cheng, T. C. (1986). General Parasitology. 2nd ed. Academic Press, Inc. Orlando.U.S.A.
33. Schmidt, G. D. and Roberts, L. S. (2001). Foundation of Parasitology. 3rd ed. McGraw Hill Publishers.
34. Schmidt, G. D. (1989). Essentials of Parasitology. Wm. C. Brown Publishers (Indian print1990, Universal Book Stall).
35. John Hyde (1996) Molecular Parasitology Open University Press.
36. J Joseph Marr and Miklos Muller (1995) Biochemistry and Molecular Biology of Parasites 2ndEdn Academic Press.

Course Outcomes (COs):

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

9. Know the stages of the life cycles of the parasites and infective stages.
10. 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.
11. Develop skills and realize significance of diagnosis of parasitic infection and treatment.
12. Understand about diseases caused by Protozoa, Helminthes, Nematodes and Arthropods at molecular level.
13. Develop their future career in medical sciences and related administrative services.

Pedagogy: Chalk and Talk, PPT, Group discussion, Seminar, Interaction, virtual lab, Lab visit

Formative Assessment	
Assessment Occasion	Weightage in Marks
House Examination/Test 1	10
Test 2	10
Written Assignment/Presentation/Project / Term Papers/Seminar	10
Total	30

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

GENERAL PATTERN OF THEORY QUESTION PAPER FOR DSCC/ OEC
(70marks for semester end Examination with 3 hrs duration)

Part-A

1. Question number 1-6 carries 2 marks each. Answer any 05 questions : 10 marks

Part-B

2. Question number 7- 14 carries 05Marks each, Answer any 06 questions : 30 marks

Part-C

3. Question number 15-18 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: 70 Marks

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