PSGR
Krishnammal College for Women

College of Excellence, nirf 2023-4th Rank
Autonomous and Affiliated to Bharathiar University
Reaccredited with 'A++' grade by NAAC, An ISO 9001: 2015 Certified Institution
Peelamedu, Coimbatore-641004

DEPARTMENT OF ZOOLOGY

CHOICE BASED CREDIT SYSTEM (CBCS) & LEARNING OUTCOMES-BASED CURRICULAR FRAMEWORK (LOCF)
(I Semester)

(For the students admitted during the academic year 2024-27 Batch and onwards)

BACHELOR OF ZOOLOGY
2024 – 2027 BATCH

College of Excellence, nirf 2023-4th Rank
Autonomous and Affiliated to Bharathiar University
Reaccredited with 'A++' grade by NAAC, An ISO 9001: 2015 Certified Institution
Peelamedu, Coimbatore-641004

PROGRAMME LEARNING OUTCOMES (PLOs)

After completion of the programme, the student will be able to:

PLO1: Appreciate the complexities of various levels of organization in the living forms and address controversial biological issues in a scientific way

PLO2: Imbibe transformational impact on the quality of education, and to adopt scientific temper and live with scientific values

PLO3: Assess the scope of animal biology, opt relevant areas for inter-disciplinary and trans-disciplinary studies

PLO4: Understand and apply the core strands of the knowledge acquired in various disciplines of life sciences to become a potential entrepreneur

PLO5: Acquire quality life science education to turn into an outstanding researcher/teacher/career woman/entrepreneur and a responsible citizen

PROGRAMME SPECIFIC OUTCOME (PSO's)

The students at the time of graduation will:

PSO1: Gain the knowledge of Zoology through theory and practical

PSO2: Analyze the relationships among animals with their ecosystems

PSO3: Learn to classify the major groups of organisms under different phyla, understanding the functioning of organisms, compare and contrast anatomical and physiological characteristics of animals

PSO4: Understand good laboratory practices as per laboratory standards, handling the sophisticated instruments/equipment to develop technical skills, research oriented skills about research methodologies, effective communication and skills of problem solving methods

PSO5: Understand the applications of zoological knowledge in Agriculture, Medical and daily life and apply the knowledge for employment - Indian Forest Service, Sericulture, Fisheries, Veterinary, Clinical Laboratory, Museum Curator, Departments and Entrepreneurship. They can go for Indian Forest Service and other competitive examinations

PSGR Krishnammal College for Women

DEPARTMENT OF ZOOLOGY
CHOICE BASED CREDIT SYSTEM (CBCS) &
LEARNING OUTCOME BASED CURRICULAR FRAMEWORK (LOCF)
BACHELOR OF ZOOLOGY – 2024-2027 BATCH
(I Semester)

(For the students admitted during the academic year 2024-27 Batch & onwards)

Sem	Part	Course code	Title of the Course	Course type	Instruction Hours/Week	Contact Hours	Tutorial	Duration of Examination	Examination Marks			Credits
									CA	ESE	Total	
I	I	TAM2301/ HIN2301/ FRE2301	Language I – T / H / F	Lang	6	88	2	3	25	75	100	3
	II	ENG2301	English Paper I	English	6	88	2	3	25	75	100	3
	III	AS23C01	Invertebrata	CC	6	88	2	3	25	75	100	5
	III	AS24CP1	Zoology Practical I	CC	3	45	-	-	-	-	-	-
	III	CE24A01	Chemistry for Biologists I	GE	4	58	2	3	20*	55*	75	4
	III	CE23AP1	Chemistry Practical for Biologists	GE	3	45	-	-	-	-	-	-
		Non Tamil Students										
	IV	NME23B1/ NME23A1	Basic Tamil I/ Advanced Tamil I	AEC	2	28	2	-	100	-	100	**2**
		Students with Tamil as Language										
	IV	NME23ES	Introduction to Entrepreneurship	AEC	2	30	-	-	100	-	100	
I-V	VI	24BONL1 24BONL2 24BONL3	Online Course I Online Course II Online Course III	ACC	-	-	-	-	-	-	-	-
I-V	VI	COM15SER	Community Service 30 hours	GC	-	-	-	-	-	-	-	-

L – Language **E - English**
CC – Core Courses **CA – Continuous Assessment**
GE – Generic Elective **ESE–End Semester Examination**
AEC – Ability Enhancement Course
ACC – Additional Credit Course
***CA conducted for 25 converted to 20, ESE conducted for 100 converted to 55**

QUESTION PAPER PATTERN

Examination System

One test for continuous assessment will be conducted on pre-determined dates i.e., commencing on the 50th day from the date of reopening. The Model exam will be conducted after completing 85th working days. Marks for ESE and CA with reference to the maximum for the courses will be as follows:

2023-2024 BATCH & ONWARDS

CA Question Paper Pattern and distribution of marks UG
Language and English
Section A 5 × 1 (No choice) : 5 Marks
Section B 4 × 5 (4 out of 6) : 20 Marks (250 words)
Section C 2 × 10 (2 out of 3): 20 Marks (500 words)
Total : 45 Marks

Core and Allied - (First 3 Units)

CA Question from each unit comprising of

One question with a weightage of 2 Marks (No choice) : 2 × 3 = 6
One question with a weightage of 5 Marks (Internal Choice at the same CLO level) : 5 × 3 =15
One question with a weightage of 8 Marks (Internal Choice at the same CLO level) : 8 × 3 =24
Total : 45 Marks

End Semester Examination – Question Paper Pattern and Distribution of Marks
Language and English
Section A 10 × 1 (10 out of 12) : 10 Marks
Section B 5 × 5 (5 out of 7) : 25 Marks (250 words)
Section A 4 × 10 (4 out of 6) : 40 Marks (600 - 700 words)
Total : 75 Marks

Core and Allied courses:
ESE Question Paper Pattern: 5 × 15 = 75 Marks
Question from each unit comprising of
One question with a weightage of 2 Marks : 2 × 5=10
One question with a weightage of 5 Marks (Internal Choice at the same CLO level): 5 × 5 =25
One question with a weightage of 8 Marks (Internal Choice at the same CLO level): 8 × 5 =40

Continuous Internal Assessment Pattern
Theory
I Year UG (23 Batch)

CIA Test : 5 marks (conducted for 45 marks after 50 days)
Model Exam : 7 marks(Conducted for 75 marks after 85 days (Each Unit 15 Marks))
Seminar/Assignment/Quiz : 5 marks
Class Participation : 5 marks
Attendance : 3 marks
Total : 25 Marks

Practical
Lab Performance : 7 marks
Regularity : 5 marks
Model Exam : 10 marks
Attendance : 3 marks
Total : 25 marks

ESE Practical Pattern
The End Semester Examination will be conducted for a maximum of 75 marks respectively with a maximum 15 marks for the record and other submissions if any.

Part IV
Introduction to Entrepreneurship
Quiz : 50 marks
Assignment : 25 marks
Project / Case study : 25 marks
Total : 100 Marks

MAPPING OF PLOS WITH CLOS

COURSE	PROGRAMME LEARNING OUTCOMES				
	PLO1	PLO2	PLO3	PLO4	PLO5
COURSE – AS23CO1					
CLO1	S	S	M	M	L
CLO2	S	S	M	M	M
CLO3	S	S	S	S	M
CLO4	S	S	S	S	M
COURSE – AS24CP1					
CLO1	S	S	S	S	S
CLO2	S	S	S	S	S
CLO3	S	S	S	S	S
CLO4	S	S	S	S	S

COURSE CODE	COURSE NAME	Category	L	T	P	Credit
AS23CO1	INVERTEBRATA	Theory	88	2	-	5

Preamble

To understand the basic classification, structure and functional details of invertebrates and to appreciate the diversity of life on earth with respect to invertebrates.

Course Learning Outcomes

On the successful completion of the course, students will be able to:

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the distinguished characteristics, the biodiversity, habitat, adaptation, organization and taxonomic status of invertebrates K1	K1
CLO2	Understand the importance of multicellularity significant to anatomical and physiological up gradation of the invertebrates	K2
CLO3	Identify the evolution of organ systems and differences in functional morphology of higher invertebrates	K3
CLO4	Analyze the advancement in systemic organization of invertebrates and connecting link to Chordates. Infer the application of Recent emerging technologies in learning and research in Zoology	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	M	M	L
CLO2	S	S	M	M	M
CLO3	S	S	S	S	M
CLO4	S	S	S	S	M

S- Strong; M-Medium; L-Low

INVERTEBRATA – AS23CO1 (88 Hrs)

Unit 1 (20 hrs)

Phylum Protozoa

General characteristics and Classification up to classes.

Type Study: *Paramecium caudatum* – External features, Nutrition, Locomotion - effective stroke, recovery stroke, Metachronal rhythm, Reproduction – Asexual - Binary fission, Sexual reproduction Conjugation, Autogamy, Endomixis, Hemimixis and Cytogamy.

General Essays

- Locomotion and Reproduction in Protista
- ***Life cycle and pathogenicity of *Plasmodium vivax* and *Entamoeba histolytica***
- Evolution of symmetry and segmentation of Metazoa

Phylum Porifera

General characteristics and Classification up to classes.

Type Study: *Leucosolenia botryoides* **-** External features, Body wall, Spicules, Canal System, Nutrition, Reproduction.

General Essays:

- Canal System in sponges
- ***Economic importance of sponges**

Unit 2 (20 hrs)

Phylum Coelenterata

General characteristics and Classification up to classes.

Type Study: ***Obelia geniculata* -** External features, Histology of the colony, Cnidoblast and its functions, Life History of Obelia, Metagenesis.

General Essays

- ***Corals, coral reefs and coral bleaching**
- ***Polymorphism in Coelentrates**

Phylum Helminthes

General characteristics and Classification up to classes.

Type Study: *Taenia solium* - External features, Body wall, Feeding, Respiratory system, Excretory System-flame cells, Nervous system, Reproductive system, Life cycle - Onchosphere and Cysticercus larvae. Life cycle and pathogenicity of *Taenia solium.*

General Essays

1. ***Life cycle and pathogenicity of:**
    - **a) *Wuchereria bancrofti***
    - **b) *Drancunculus medinensis***
    - **c) *Ancylostoma duodenale***
2. ***Parasitic adaptations in Helminthes**

Unit 3 **(19 hrs)**

Phylum Annelida

General characteristics and Classification up to classes.

Type Study: *Megascolex mauritii* - External features, Body wall, Coelom, Locomotion, Digestive system, Respiratory system, Excretory system - Meganephridia, Micronephridia, Pharyngeal nephridia, Nervous system, Reproductive system.

General Essays

- Metamerism in annelids
- ***A Brief Account on Vermiculture**

Phylum Arthropoda

General characteristics and Classification up to classes.

Type study: *Periplaneta americana* - External features, Body wall, Mouthparts, Digestive system, Respiratory system, Circulatory system, Nervous system, Sense organs, excretory system, Reproductive system.

General Essays

- Peripatus- Affinities as a living fossil.
- Metamorphosis in Insects
- ***A Brief Account on Apiculture**

Unit 4 **(19 hrs)**

Phylum Mollusca

General characteristics and Classification up to classes.

Type Study: *Pila globosa* - External features, Shell, Digestive system, Respiratory system, Circulatory system, Nervous system, Sense organs - Eyes, Osphradium, Statocyst, Tentacles, Excretory system, Reproductive system.

General Essays

- Torsion in Mollusca
- ***A Brief Account on Pearl Culture**

Phylum Echinodermata

General characteristics and Classification up to classes.

Type Study: *Asterias rubens* - External features, Pedicellaria - Structure and Function, Digestive system, Respiratory system, Water vascular system - Structure and Function, Circulatory system - Perihaemal and Haemal system, Nervous system, Sense organs, Excretory system, Reproductive system.

General Essays

- ***Larval forms of Echinoderms and their evolutionary significance**
- ***Economic importance in Echinoderms**
- Affinities with Chordates

Unit 5 **(10 hrs)**

Introduction to technologies in Industrial 4.0, Applications –Automated taxonomic Identification of invertebrates, Confocal Image processing of invertebrates for identification and classification, Bio mimicry/biomimetics of invertebrates – Ant colony optimization algorithms, Beekeeping using Machine learning, Detection and identification of Stored – Grain insects using Deep learning, IOT based smart monitoring for sericulture, ***Virtual e-museum.**

***Blended Mode**

Text Books:

S. No.	Authors	Title of the Book	Publishers	Year and Edition
1	Jordan E.L and Verma P.S	Invertebrate Zoology	S. Chand and Co	2022, 1 edition
2	Nair N. C.	A Text Book of Invertebrates	Saras Publications	2015, 5 edition
3	Kaliraj, P. and Devi, T.	Artificial Intelligence Theory, models and Applications	CRC Press, Taylor & Francis Group	2022
4	Kaliraj, P. and Devi, T.	Innovating with Augmented Reality : Applications in Education and Industry	CRC Press, Taylor & Francis Group	2022
5	Kaliraj, P. and Devi, T.	Big Data Applications in Industry 4.0	CRC Press, Taylor & Francis Group	2022

Reference Books:

S. No.	Authors	Title of the Book	Publishers	Year and Edition
1.	Barrington E J W	Invertebrate Structures and Function	English Language Book Society	1979, 1 edition
2.	Ekambaranatha Ayyar, M. & Ananthakrishnan, T.N.	Manual of Zoology Vol-I (Invertebrata) Part I & II	Vishwanathan (P) Ltd. Chennai	1995, 1 edition
3.	Mandal Eatik Baran	Biology of Non chordates	PHI Learning Private Limited	2018, 2 edition
4.	Kotpal R.L., Agarwal S.K and Ketarpal R.P.R	Modern Text Book of Zoology Invertebrates	Rastogi Publications	2011, 3 edition
5.	Robert	Invertebrate Zoology	W. B. Saunders International	1974, 1 edition
6.	Pechenik Jan A	Biology of the Invertebrates	McGraw-Hill International	2016, 7 edition

Related Online Contents

1. Introduction to Industry 4.0 and Industrial Internet of Things by Prof. Sudip Mishra, IIT Kharagpur.
2. A Complete Guide to Industry 4.0-Udemy
3. Introduction to Industry 4.0

Reference

1. https://academic.oup.com/sysbio/article/68/6/876/5368535
2. https://besjournals.onlinelibrary.wiley.com/doi/10.1111/2041-210X.13428
3. https://www.mdpi.com/2313-7673/4/3/62/htm
4. https://www.bio-mar.com/biological-materials-biomimetics
5. https://www.sciencedirect.com/science/article/abs/pii/S1568494609000672
6. https://www.hyperhyve.com/post/beekeeping-using-machine-learning
7. https://www.researchgate.net/publication/322958397_Detection_of_stored-grain_insects_using_deep_learning
8. https://www.ijrte.org/wp-content/uploads/papers/v8i2/B1801078219.pdf
9. https://www.perlego.com/book/3799692/industry-40-technologies-for-education-transformative-technologies-and-applications-pdf

COURSE CODE AS24CP1	COURSE NAME ZOOLOGY PRACTICAL I	Category	L	T	P	Credit
		Practical	-	-	90	4

Preamble

- To enable the students to expose practically
- To learn the taxonomy of invertebrates and Chordates.
- To understand the relationships between invertebrates, Chordates and their environment.
- To learn the location and appearance of internal organs in a typical insect.
- To understand the structure and functional organization of animals.

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	To understand the basic concepts of zoological classification and identify the invertebrates and chordates	K1
CLO2	To distinguish the diversity and relationships between major groups of invertebrates and Chordates.	K2
CLO3	To examine the morphology and anatomy of invertebrates and Chordates	K3
CLO4	To relate the diversity and culture/rearing of invertebrates and chordates and infer their economic utility.	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	S	S	S
CLO2	S	S	S	S	S
CLO3	S	S	S	S	S
CLO4	S	S	S	S	S

S- Strong

CORE PRACTICAL - I AS23CPI (90 Hrs)

Dissections (**35 hrs)**

1. **Cockroach**
   - a. Digestive system (3 hrs)
   - b. Nervous system, (3 hrs)
   - c. Male & Female Reproductive systems (3 hrs)

2. **Fish**
   - a. Viscera, (3 hrs)
   - b. Digestive system, (3 hrs)
   - c. Reproductive system, (3 hrs)
   - d. Brain and Cranial nerves system (4 hrs)

3. **Earthworm**
   - a. Digestive system, (3 hrs)
   - b. Nervous system (4 hrs)
   - c. Reproductive system (3 hrs)

4. **Prawn** – Nervous system (3 hrs)

Mounting (**15 hrs)**

1. Mounting of scales of fishes (2 hrs)
2. Mounting of gill arch (2 hrs)
3. Mounting of earthworm setae (2 hrs)
4. Mounting of mouth parts of cockroach/mosquito/honey bee (3 hrs)
5. Mounting of Prawn appendages (3 hrs)
6. Whole mount of Euglena, Amoeba and Paramecium (3 hrs)

Spotters:

Classify giving reasons:-Parамecium, Leucosolenia, Obelia colony, Prawn, Octopus, Star fish, Ascidian, Shark, Salamander, Pigeon, Bat. **(2 hrs)**

Draw labelled sketches:-T.S. of Tape worm, Leech, Amphioxus, Frog – Skull, Pectoral girdle, Pelvic girdle, Fore limb and Hind limb. **(2 hrs)**

Relate Structure and function: - Gemmule, Entire & Scolex of tapeworm, Nereis -parapodium, Heteronereis, Honey bee-Queen, Drone, Worker; Quill feather, Tortoise, Narcine-Electric organ. **(2 hrs)**

Write descriptive notes:- Nauplius larva, Pila, Bipinnaria larva, Balanoglossus, Echeneis - Sucker fish, Draco - Flying lizard, Rat snake, Cobra, Hyla. **(2 hrs)**

Give biological significance: - Chaetopterus, Peripatus, Limulus, Scorpion, Pearl oyster, Hippocampus male and female, Exocetus – Flying fish, Chameleon. **(2 hrs)**

Field observations combined with photography and/or videography

1) Study of live water specimens in nearby water bodies/pond ecosystem **(5 hrs)**
2) Study of insect fauna in the college campus **(5 hrs)**
3) Visit to a sericulture farm/ Apiary/Museum **(5 hrs)**
4) Study of six common birds from different orders **(5 hrs)**

Culture Methods

1) Culture of unicellular organisms (Amoeba/Paramecium/Euglena)
2) Culture of multicellular organisms (Earthworm) **(10 hrs)**

Reference Books:

S. No.	Authors	Title of the Book	Publishers	Year and Edition
1	Sinha. J, Chatterjee. A. K, Chattopadhyay. P	Advanced Zoology Practical	Arunabha Sen Books and Allied (P) Ltd	2019, 9th edition
2	Lal S. S.	Textbook of Practical Zoology Vertebrate	Rastogi Publication	2004, 8th edition
3	Lal S. S.	Textbook of Practical Zoology Invertebrate	Rastogi Publication	2004

Pedagogy:

Demonstration, practical, dissection, slides, spotters, field visit, culture methods, power point presentation, e-content, group discussion.

COURSE CODE	COURSE NAME	CATEGORY	L	T	P	CREDIT
CE24A01	CHEMISTRY FOR BIOLOGISTS– I (Offered to B.Sc Botany/Zoology/ Biotechnology)	THEORY	58	2	-	4

Preamble

To enable the students to

- gain knowledge about the nature of bonding and hybridization
- learn the importance of aromaticity and isomerism
- understand the preparation of standard solutions and chromatographic techniques
- acquire knowledge on the significance of amino acids and proteins
- familiarize the applications of solar energy and water treatment techniques

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the types of bonding , organic reagents, aminoacids and the terms involved in analytical /environmental chemistry	K1
CLO2	Understand the concept of hybridization, classify aromatic/ aromatic compounds, aminoacids/proteins and demonstrate preparation of standard solutions.	K2
CLO3	Interpret the structure & stereo isomerism of organic compo and illustrate the importance of chromatogra techniques/renewable sources and water treatment technologies	K3
CLO4	Appraise the theories of bonding, conformational analysis, experimental methods in analytical techniques, softening process and its applications	K4

Mapping with programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	S	S	S
CLO2	S	S	S	S	S
CLO3	S	S	S	S	S
CLO4	S	S	S	S	S

- S- Strong ; M-Medium

CHEMISTRY FOR BIOLOGISTS - I (CE24A01)
(offered to B.Sc Botany / Zoology/ Biotechnology) (58 hrs)

UNIT I **(12 hrs)**

Bonding

Types of bonding - Covalent bond - nature, structure and hybridization of CH_4, C_2H_4, $C_2H_2$and C_6H_6, molecule.Ionic bond - Nature of ionic bond, structure of NaCl and CsCl.
Hydrogen bonding - inter and intra molecular, nature and its effect on its structure and its consequences.

Shapes and hybridization of $BeCl_2$, H_2O, NH_3 and PCl_5based on VSEPR theory.

UNIT II **(12 hrs)**

Organic reactions and Stereoisomerism

Types of organic reagents - electrophiles, nucleophiles and free radicals.
Aromaticity - Huckel's rule, mechanism of nitration, sulphonation,halogenation, Friedel craft's alkylation and acylation of benzene.

Stereoisomerism - geometrical isomerism (cis - trans isomerism only), optical isomerism (lactic acid and tartaric acid). Conformation - a simple treatment of ethane and n-butane .

UNIT III **(11 hrs)**

Analytical Chemistry

Role and importance of analytical chemistry -principle of volumetric analysis - calibration of glasswares, standardization - experimental requirements -concentration units (normality and molarity) –types and preparation of standard solutions (primary and secondary standards). Types of titrations - indicators for acid-base titrations.Chromatography– principle and classification- paper, column, thin layer, electrophoresis and ion-exchange chromatography and its applications.

UNIT IV **(11 hrs)**

Amino acids and Proteins

Amino acids -classification, preparation of amino acids by Gabriel phthalimide synthesis, Erlen Meyer azlactone synthesis.Properties of amino acids and action of heat on α, β, γ amino acids -dipeptide synthesis. Protein- classification according to composition and function, primary and secondary structures, properties and colour reactions of proteins.

UNIT V **(12 hrs)**

Solar energy and Water treatment

Solar energy - renewable energy and non - renewable energy sources - solar energy - solar cells, solar heating, solar collector (flat plate collector only), applications.

Water treatment - hardness of water- temporary and permanent hardness, disadvantages of hard water. Softening methods - reverse osmosis, zeolite and demineralization process. Purification of water for domestic purpose - disinfection by chlorine, ozone and UV light.

Text Books :

S.No	Authors	Title of the Boo	Publishers	Year of Publication & Edition
1.	Dr. V. Veeraiyan	Textbook of Allied Chemistry	High mount Publis house, triplic Chennai.	Reprint 2006
2.	R. Gopalan. P.S. Subramani and K. Rengarajan	Elements of Analyti Chemistry	Sultan Chand & Sons Educational Publisher New Delhi	Reprint 2013
3.	ArunBahl B. S. Bahl	Advanced Organic Chemistry	S. Chand Sons Comp Pvt Ltd,	Reprint 2009
4.	P.C Jain & Monika Jain	Engineering chemis	DhanpatRai Publishin Co Pvt Ltd.	Reprint 2003

Pedagogy:

Lecture by chalk and talk, power point presentation, e-content, numerical exercise, group discussion, assignment, quiz, peer learning, seminar

Course Designers

1. Dr.R.Revathi
2. Dr.N.Anusuya

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DEPARTMENT OF ZOOLOGY

CHOICE BASED CREDIT SYSTEM (CBCS) & LEARNING OUTCOMES- BASED CURRICULAR FRAMEWORK (LOCF)

(II Semester)

(For the students admitted during the academic year 2024-27 Batch and onwards)

BACHELOR OF ZOOLOGY
2024 – 2027 BATCH

PROGRAMME LEARNING OUTCOMES (PLOs)

After completion of the programme, the student will be able to:

PLO1: Appreciate the complexities of various levels of organization in the living forms and address controversial biological issues in a scientific way

PLO2: Imbibe transformational impact on the quality of education, and to adopt scientific temper and live with scientific values

PLO3: Assess the scope of animal biology, opt relevant areas for inter-disciplinary and trans-disciplinary studies

PLO4: Understand and apply the core strands of the knowledge acquired in various disciplines of life sciences to become a potential entrepreneur

PLO5: Acquire quality life science education to turn into an outstanding researcher/teacher/career woman/entrepreneur and a responsible citizen

PROGRAMME SPECIFIC OUTCOME (PSO's)

The students at the time of graduation will:

PSO1: Gain the knowledge of Zoology through theory and practical

PSO2: Analyze the relationships among animals with their ecosystems

PSO3: Learn to classify the major groups of organisms under different phyla, understanding the functioning of organisms, compare and contrast anatomical and physiological characteristics of animals

PSO4: Understand good laboratory practices as per laboratory standards, handling the sophisticated instruments/equipment to develop technical skills, research oriented skills about research methodologies, effective communication and skills of problem solving methods

PSO5: Understand the applications of zoological knowledge in Agriculture, Medical and daily life and apply the knowledge for employment - Indian Forest Service, Sericulture, Fisheries, Veterinary, Clinical Laboratory, Museum Curator, Departments and Entrepreneurship. They can go for Indian Forest Service and other competitive examinations

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CHOICE BASED CREDIT SYSTEM (CBCS) & LEARNING OUTCOME BASED CURRICULAR FRAMEWORK (LOCF)
BACHELOR OF ZOOLOGY – 2024-2027 BATCH
SCHEME OF EXAMINATION
SEMESTER II

Sem	Part	Course code	Title of the Course	Course type	Instruction Hours/Week	Contact Hours	Tutorial	Duration of Examination	Examination Marks			Credits
									CA	ESE	Total	
II	I	TAM2302/ HIN2302/ FRE2302	Tamil Paper II/ Hindi Paper II/ French Paper II	L	6	88	2	3	25	75	100	3
	II	ENG2302	English Paper II	E	5	73	2	3	25	75	100	3
	III	AS24C02	Chordata	CC	6	88	2	3	25	75	100	5
		AS24CP1	Zoology Practical I	CC	3	45	-	3	25	75	100	5
		CE24A02	Chemistry for Biologists II	GE	5	73	2	3	20	55#	75#	4
		CE23AP1	Chemistry Practical for Biologists	GE	3	45	-	3	15	35#	50#	2
	IV	NM24UHR	Universal Human Values and Human Rights	AECC	2	30	-	-	100	-	100	2
		NM23GAW	General Awareness	AEC	SS	-	-	-	100	-	100	Gr.
		*NME23B2/ *NME23A2	Basic Tamil II/ Advanced Tamil II	AEC	SS	-	-	-	100	-	100	Gr.
I-V	VI	COM15SER	Community Service 30 Hours	GC	-	-	-	-	-	-	-	-
		24BONL1 24BONL2 24BONL3	Online Course 1 Online Course 2 Online Course 3	ACC	-	-	-	-	-	-	-	-

* After class hours
# CA conducted for 25 converted to 20, ESE conducted for 75 converted to 55

L – Language
E - English
CC – Core Courses
CA – Continuous Assessment
GE – Generic Elective
ESE–End Semester Examination
AEC – Ability Enhancement Course
SS – Self study
ACC – Additional Credit Course

QUESTION PAPER PATTERN

Examination System

One test for continuous assessment will be conducted on pre-determined dates i.e., commencing on the 50th day from the date of reopening. The Model exam will be conducted after completing 85th working days. Marks for ESE and CA with reference to the maximum for the courses will be as follows:

2023-2024 BATCH & ONWARDS

CA Question Paper Pattern and distribution of marks UG
Language and English
Section A 5 × 1 (No choice) : 5 Marks
Section B 4 × 5 (4 out of 6) : 20 Marks (250 words)
Section C 2 × 10 (2 out of 3): 20 Marks (500 words)
Total : 45 Marks

Core and Allied - (First 3 Units)

CA Question from each unit comprising of

One question with a weightage of 2 Marks (No choice) : 2 × 3 = 6
One question with a weightage of 5 Marks (Internal Choice at the same CLO level) : 5 × 3 =15
One question with a weightage of 8 Marks (Internal Choice at the same CLO level) : 8 × 3 =24
Total : 45 Marks

End Semester Examination – Question Paper Pattern and Distribution of Marks
Language and English
Section A 10 × 1 (10 out of 12) : 10 Marks
Section B 5 × 5 (5 out of 7) : 25 Marks (250 words)
Section A 4 × 10 (4 out of 6) : 40 Marks (600 - 700 words)
Total : 75 Marks

Core and Allied courses:
ESE Question Paper Pattern: 5 × 15 = 75 Marks
Question from each unit comprising of
One question with a weightage of 2 Marks : 2 × 5=10
One question with a weightage of 5 Marks (Internal Choice at the same CLO level): 5 × 5 =25
One question with a weightage of 8 Marks (Internal Choice at the same CLO level): 8 × 5 =40

Continuous Internal Assessment Pattern
Theory
I Year UG (23 Batch)

CIA Test : 5 marks (conducted for 45 marks after 50 days)
Model Exam : 7 marks(Conducted for 75 marks after 85 days (Each Unit 15 Marks))
Seminar/Assignment/Quiz : 5 marks
Class Participation : 5 marks
Attendance : 3 marks
Total : 25 Marks

Practical
Lab Performance : 7 marks
Regularity : 5 marks
Model Exam : 10 marks
Attendance : 3 marks
Total : 25 marks

ESE Practical Pattern
The End Semester Examination will be conducted for a maximum of 75 marks respectively with a maximum 15 marks for the record and other submissions if any.

Part IV
Foundation Course – Universal Human Values and Human Rights
Quiz : 50 marks
Assignment : 25 marks
Project / Case study : 25 marks
Total : 100 Marks

MAPPING OF PLOS WITH CLOS

COURSE	PROGRAMME LEARNING OUTCOMES				
	PLO1	**PLO2**	**PLO3**	**PLO4**	**PLO5**
COURSE – AS24CO2					
CLO1	S	S	M	M	L
CLO2	S	S	M	M	M
CLO3	S	S	S	S	M
CLO4	S	S	S	S	M
COURSE – AS24CP1					
CLO1	S	S	S	S	S
CLO2	S	S	S	S	S
CLO3	S	S	S	S	S
CLO4	S	S	S	S	S

COURSE CODE	COURSE TITLE	Category	L	T	P	Credit
AS24CO2	CHORDATA	Theory	88	2	-	5

Preamble

To understand the basic classification, structure and functional details of invertebrates and to appreciate the diversity of life on earth with respect to invertebrates.

Course Learning Outcomes

On the successful completion of the course, students will be able to:

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the distinguished characteristics, the biodiversity, habitat, adaptation, organization and taxonomic status of invertebrates K1	K1
CLO2	Understand the importance of multicellularity significant to anatomical and physiological up gradation of the invertebrates	K2
CLO3	Identify the evolution of organ systems and differences in functional morphology of higher invertebrates	K3
CLO4	Analyze the advancement in systemic organization of invertebrates and connecting link to Chordates. Infer the application of Recent emerging technologies in learning and research in Zoology	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	M	M	L
CLO2	S	S	M	M	M
CLO3	S	S	S	S	M
CLO4	S	S	S	S	M

S- Strong; M-Medium; L-Low

CHORDATA-AS24CO2 (88 hrs)

UNIT I: **(20 Hrs)**

Phylum Chordata Introduction, Three fundamental Chordate characters, Advancements of Chordates over other phyla. Brief classification of chordate with characters.

PROTOCHORDATA- General Characters and affinities of Urochordata and Hemichordata

Type study:Cephalochordata, Amphioxus- Affinities and Systematic Position, Habits and Habitat, External features, Body wall, Coelom, Atrium, Digestive System, Respiratory mechanism, Circulatory system, excretory system and Reproductive system.

General Essays

- *Dipnoi- lung fishes-affinities and systematic Position
- Overview of Phylogenetic analysis using Machine learning

PISCES- General Characters

General characteristics of Chondrichthyes and Osteichthyes, classification upto class

Type study: Shark - Systematic Position, Habits and Habitat, External features, Exoskeleton- Placoid Scales, Digestive System, Respiratory, Nervous system- Sense organs-Olfactory organs, Eyes, Internal ears, Neuromast or lateral line system, Ampullae of Lorenzini. Urinogenital system.

General Essays

- Migration, in fishes
- *Virtual E-museum to identify and learn different species of Pisces

UNIT II: AMPHIBIA **(17 hrs)**

General characteristics and classification upto order

Type study: Frog- Systematic Position, Habits and Habitat, External features, Sexual dimorphism, Digestive System, Respiratory system- Cutaneous respiration, Buccal respiration and Pulmonary respiration. Respiratory, Circulatory system, Nervous system, Urinogenital system

General Essays

- *Parental care in Amphibia
- Outline on Image processing for taxonomic classification

UNIT III: REPTILIA **(17 hrs)**

General characteristics and classification upto order

Type study: Calotes - Systematic Position, Habits and Habitat, External features, Digestive System, Respiratory system- Respiratory mechanism, Circulatory system, Nervous system, Sense organs, Jacobson's organs, Structure and function of Eye and Ear, Urinogenital system

General Essays

- *Poison apparatus and Biting mechanism in snakes, First aid treatment for snake bite and common poisonous and non – poisonous snakes in India
- Overview of artificial intelligence for modelling to study Reptile behavior

UNIT IV: AVES **(17 hrs)**

General characteristics and classification upto superorder

Type study: Pigeon -Systematic Position, Habits and Habitat, External features, Feathers- Structure of a typical feather in Pigeon, Types of feathers in pigeon. Muscular System- Flight muscles, Digestive System, Respiratory system- Syrinx and voice production, Air sacs and functions. Respiratory mechanism, Circulatory system, Nervous system-Brain, Spinal cord, cranial nerves and spinal nerves, Urinogenital system.

General Essays

- *Archaeopteryx*—a connecting link
- *Flightless birds, Migration in birds

UNIT V: MAMMALIA **(17 hrs)**

General characteristics and classification upto subclass

Type study: Rabbit- Systematic Position, Habits and Habitat, External features, Digestive System, Respiratory system, Circulatory system. Nervous systemStructure and function of Eye and Ear, Excretory system, Reproductive system.

General Essays

- *Aquatic adaptations in mammals
- *GPS Tracking systems for monitoring the locomotion of wild animals.

***Blended Mode**

Text Books

S. No.	Authors	Title of the Book	Publishers	Year of Publication
1	Jordan.E.L and Verma.P.S	Chordate Zoology	S.Chand& Co	2014
2	A. Thangamani S. Prasannakumar L.M. Narayanan N. Arumugam,	A Text Book of Chordates	Saras Publications	2013

Reference Books

S.No.	Authors	Title of the Book	Publishers	Year of Publication, Edition
1	Ekambaranatha Ayyar.M & Ananthakrishnan.T.N	A Manual of Zoology Vol.II-Part I & II	S.Vishwanathan Pvt.Ltd	2010
2	Kotpal R.L	Modern Text Book of Zoology – Vertebrates	Global Media Publications	2012
3	B Waterman, Allyn J	Chordate Structure and Function	Mac Milan & Co.,	1971
4	Young, J. Z	The Life of Vertebrates	Oxford university press	2004, 3rdEdn.

5	Pough H	Vertebrate life (e-book)	Pearson International	2018, 9thEdn.
6	Marshall and Williams Edited by Veer Baala Rastogi	Parker and Haswell Textbook of ZOOLOGY - Vertebrates -	Med tech Science Press	Volume I 2021
7	Ezra Samberg	Vertebrate Zoology	Syrawood Publishing House	2018

References

1. https://www.biorxiv.org/content/10.1101/2020.01.10.902239v4.full
2. https://www.sciencedirect.com/science/article/abs/pii/S0920548919300935 3
3. https://link.springer.com/article/10.1007/s10336-012-0908-1
4. https://wildlifeact.com/about-wildlife-act/monitoring-tracking-technology/
5. http://emuseum.psgrkcw.com/

COURSE CODE AS24CP1	COURSE TITLE ZOOLOGY PRACTICAL I	Category	L	T	P	Credit
		Practical	-	-	90	4

Preamble

- To enable the students to expose practically
- To learn the taxonomy of invertebrates and Chordates.
- To understand the relationships between invertebrates, Chordates and their environment.
- To learn the location and appearance of internal organs in a typical insect.
- To understand the structure and functional organization of animals.

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	To understand the basic concepts of zoological classification and identify the invertebrates and chordates	K1
CLO2	To distinguish the diversity and relationships between major groups of invertebrates and Chordates.	K2
CLO3	To examine the morphology and anatomy of invertebrates and Chordates	K3
CLO4	To relate the diversity and culture/rearing of invertebrates and chordates and infer their economic utility.	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	S	S	S
CLO2	S	S	S	S	S
CLO3	S	S	S	S	S
CLO4	S	S	S	S	S

S- Strong

ZOOLOGY PRACTICAL I AS24CP1 (90 Hrs)

Dissections (**35 hrs)**

1. **Cockroach**
   - a. Digestive system **(3 hrs)**
   - b. Nervous system, **(4 hrs)**
   - c. Male & Female Reproductive systems **(3 hrs)**

2. **Fish**
   - a. Viscera, **(4 hrs)**
   - b. Digestive system, **(4 hrs)**
   - c. Reproductive system, (**4 hrs)**

3. **Earthworm**
   - a. Digestive system, **(3 hrs)**
   - b. Nervous system **(4 hrs**)
   - c. Reproductive system **(3 hrs)**

4. **Prawn** – Nervous system **(3 hrs)**

Mounting (**15 hrs)**

1. Mounting of scales of fishes **(2 hrs)**
2. Mounting of gill arch **(2 hrs)**
3. Mounting of earthworm setae **(2 hrs)**
4. Mounting of mouth parts of cockroach/mosquito/honey bee **(3 hrs)**
5. Mounting of Prawn appendages **(3 hrs)**
6. Whole mount of Euglena/Amoeba/Paramecium **(3 hrs)**

Spotters:

Classify giving reasons:-Paramecium, Leucosolenia, Obelia colony, Prawn, Octopus, Star fish, Ascidian, Shark, Salamander, Pigeon, Bat. **(2 hrs)**

Draw labelled sketches:-T.S. of Tape worm, Leech, Amphioxus, Frog – Skull, Pectoral girdle, Pelvic girdle, Fore limb and Hind limb. **(2 hrs)**

Relate Structure and function: - Gemmule, Tapeworm Entire & Scolex of tapeworm, Nereis -parapodium, Heteronereis, Honey bee-Queen, Drone, Worker; Quill feather, Tortoise, Narcine-Electric organ. **(2 hrs)**

Write descriptive notes:- Nauplius larva, Pila, Bipinnaria larva, Balanoglossus, Echeneis - Sucker fish, Draco - Flying lizard, Rat snake, Cobra, Hyla. **(2 hrs)**

Give biological significance: - Chaetopterus, Peripatus, Limulus, Scorpion, Pearl oyster, Hippocampus male and female, Exocetus – Flying fish, Chameleon. **(2 hrs)**

Field observations combined with photography and/or videography

1) Study of live water specimens in nearby water bodies/pond ecosystem **(5 hrs)**
2) Study of insect fauna in the college campus **(5 hrs)**
3) Visit to a sericulture farm/ Apiary/Museum **(5 hrs)**
4) Study of six common birds from different orders **(5 hrs)**

Culture Methods

1) Culture of unicellular organisms (Amoeba/Paramecium/Euglena)
2) Culture of multicellular organisms (Earthworm) **(10 hrs)**

Reference Books:

S. No.	Authors	Title of the Book	Publishers	Year and Edition
1	Sinha. J, Chatterjee. A. K, Chattopadhyay. P	Advanced Zoology Practical	Arunabha Sen Books and Allied (P) Ltd	2019, 9th edition
2	Lal S. S.	Textbook of Practical Zoology Vertebrate	Rastogi Publication	2004, 8th edition
3	Lal S. S.	Textbook of Practical Zoology Invertebrate	Rastogi Publication	2004

Pedagogy:

Demonstration, practical, dissection, slides, spotters, field visit, culture methods, power point presentation, e-content, group discussion.

COURSE CODE	COURSE NAME	CATEGORY	L	T	P	CREDIT
CE24A02	CHEMISTRY FOR BIOLOGISTS - II (Offered to B.Sc Botany/Zoology/ Biotechnology)	THEORY	73	2	-	4

Preamble

To enable the students to

- learn the nomenclature, applications of coordination compounds and their significance in bioinorganic chemistry
- analyze the chemistry behind fuels, fertilizers and polymers.
- gain knowledge about the functions of various drugs and important terms in the chemistry of dyes.
- understand the basic concepts of chemical kinetics and catalysis.
- familiarize the importance of pH and Buffer

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	recall the nomenclature of coordination compounds, types of fuel gases, polymers, synthetic drugs, dyes, catalysis and buffer	K1
CLO2	compare various theories to explain the formation of coordination compounds, uses of different fuels, polymers and drugs. Recognize the theories of kinetics and significance of pH / buffer	K2
CLO3	examine the applications of chelating compounds, polymers, dyes and catalytic enzymes. Calculate the degree of hydrolysis using various methods	K3
CLO4	appraise the importance of inorganic metal, inorganic polymers, pH and buffer in the living system. Categorize polymer, drugs based on mode of action and analyze the mechanism of catalytic action	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	M	S	S
CLO2	S	S	M	S	S
CLO3	S	S	S	S	S
CLO4	S	S	S	S	S

S-Strong; M-Medium;

CHEMISTRY FOR BIOLOGISTS - II CE24A02

(Offered to B.Sc Botany/Zoology/ Biotechnology) (73 hrs)

Unit I (15 hrs)

Coordination and Bioinorganic Chemistry

Nomenclature - mononuclear complexes. Theories- Werner, Sidgwick - EAN rule, Pauling's theory - postulates and examples. Applications of coordination compounds - in qualitative and quantitative analysis. Chelation and its industrial importance with reference to EDTA in analytical chemistry. Structural features and biological functions of Chlorophyll, Haemoglobin, Rubredoxin and Ferredoxin.

Unit II (15 hrs)

Industrial Chemistry

Fuel gases - Natural gas, water gas, semi water gas, carbureted water gas, producer gas and oil gas (manufacturing details not needed) composition and uses only.

Fertilizers - Primary and secondary nutrients, need and requirements of fertilizers - preparation, properties and uses of urea, super phosphate of lime, ammonium sulphate, triple super phosphate and potassium nitrate. Pesticides - classification with examples.

Polymers - Classification - preparation and uses of PVC, Teflon & Polyethylene. Inorganic polymers - synthesis, properties and uses of silicones.

Unit III (15hrs)

Synthetic drugs and Synthetic dyes

Synthetic drugs - Introduction, classification - based on chemical structure and therapeutic action and requirements of a drug. Sulpha drugs and mode of action. Hypnotics, sedatives, anticonvulsants, antidepressants, antipyretics, anaesthetics, antihistamines, anticoagulant, analgesics, diuretics, antimalarial, antifungal, antibacterial, antitubercular and antileprosy - definition, examples and side effects.

Synthetic dyes - Introduction, chromophore, auxochrome, chromogen, bathochromic, hypsochromic, hyperchromic and hypochromic shifts. Azo dyes, vat dyes, mordant dyes. Food colours- general treatment.

Unit IV (14hrs)

Chemical Kinetics and Catalysis

Chemical Kinetics - Definition - order and molecularity - rate of reaction - expression for first, second and third order reactions (derivation not required only equation). Effect of temperature on

reaction rate - Arrhenius equation - concept of activation energy - collision theory (elementary treatment only) - failures of collision theory.

Catalysis - types, mechanism of catalytic action - homogeneous, heterogeneous and enzyme catalysis, industrial applications of enzymes.

Unit V

(14hrs)

Importance of pH and Buffer

pH, pH scale, buffer solutions, types - buffer mixture of weak acid and its salt, buffer mixture of weak base and its salt. Importance of pH and buffer in the living system.

Hydrolysis of salts - types (strong acid vs strong base, weak acid vs strong base, strong acid vs weak base, weak acid vs weak base) - hydrolysis constant (K_h) - relation between K_h, K_a and K_w - degree of hydrolysis and determination - indirect method, electrical conductance method (Bredig's method), freezing point depression and from distribution law.

Text Books:

S.No.	Authors	Title of the Book	Publishers	Year of Publication
1.	V.Veeraiyan	Text book of Allied Chemistry	Highmount Publishing house, Chennai.	2005, 1 Edn
2.	B. S. Bahl, Arun Bahl, G. D. Tuli	Essentials of Physical Chemistry	S. Chand & Co., Pvt., Ltd., New Delhi.	2012
3.	B. K. Sharma	Industrial Chemistry	GOEL Publishing House	2014,17 Edn

Pedagogy:

Lecture by chalk and talk, power point presentation, e-content, numerical exercise, group discussion, assignment, quiz, peer learning, seminar

Course Designers

1. Dr. R. Revathi
2. Dr. N. Anusuya

COURSE CODE	COURSE NAME	CATEGORY	L	T	P	CREDIT
CE24AP1	**CHEMISTRY PRACTICAL FOR BIOLOGISTS** (offered to B.Sc Botany / Zoology/ **Biotechnology**)	PRACTICAL	**-**	**-**	**90**	**2**

Preamble

To enable the students to

- estimate the given substance volumetrically.
- analyse and identify the organic compounds qualitatively

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	define the various terms in volumetric analysis	K1
CLO2	perform the volumetric analysis and estimate the quantity present.	K2, K3
CLO3	identify and analyse organic compounds	K3

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	S	S	S
CLO2	S	S	S	S	S
CLO3	S	S	S	S	S

S-Strong;

CHEMISTRY PRACTICAL FOR BIOLOGISTS CE24AP1

(offered to B.Sc Botany /Zoology/ Biotechnology) (90hrs)

1. Volumetric Analysis

i. Estimation of sodium hydroxide using standard sodium carbonate.

ii. Estimation of Carbonate, bicarbonate mixture using sodium hydroxide

iii. Estimation of hydrochloric acid using standard oxalic acid.

iv. Estimation of oxalic acid using standard sulphuric acid.

v. Estimation of ferrous sulphate using standard Mohrs's salt solution.

vi. Estimation of potassium permanganate using standard oxalic acid.

vii.Estimation of hardness of water (Temporary and permanent).

2. Organic Compound Analysis

Systematic analysis of organic compounds containing one functional group and characterization by confirmatory tests and preparing suitable derivative - Phenols, Acids (mono and di), Aromatic primary amine, Amides (mono and diamide) and Glucose.

Text Book:

Lab Manual- Prepared by Faculty, Department of Chemistry, PSGRKCW

S.No.	Authors	Title of the Book	Publishers	Year of Publication
1	N.S.Gnanapragasam, G.Ramamurthy	Organic Chemistry Lab Manual	S.Viswanathan Printers & Publishers Pvt Ltd	3rd Edn.,2011
2	A.I. Vogel	A text book of quantitative inorganic analysis	Longman publishers	12thEdn., 2011

Pedagogy

Demonstration and individual hands on Practicals.

Course Designers:

1. Dr.R.Revathi
2. Dr.N.Anusuya

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Peelamedu, Coimbatore-641004

DEPARTMENT OF ZOOLOGY

CHOICE BASED CREDIT SYSTEM (CBCS) & LEARNING OUTCOMES- BASED CURRICULAR FRAMEWORK (LOCF)

(III Semester)

(For the students admitted during the academic year 2024-27 Batch and onwards)

BACHELOR OF ZOOLOGY

2024 – 2027 BATCH

DEPARTMENT OF ZOOLOGY
BACHELOR OF SCIENCE - ZOOLOGY
CHOICE BASED CREDIT SYSTEM (CBCS)
LEARNING OUTCOME BASED CURRICULAR FRAMEWORK (LOCF)
SYLLABUS & SCHEME OF EXAMINATION
2024-2027 BATCH
SEMESTER III

Sem	Part	Course code	Title of the Course	Course type	Instruction Hours/Week	Contact Hours	Tutorial	Duration of Examination	Examination Marks			Credits
									CA	ESE	Total	
III	I	TAM2303/ HIN2303/ FRE2303	Tamil Paper III/ Hindi Paper III/ French Paper III	L	6	88	2	3	25	75	100	3
	II	ENG2403	English Paper III	E	5	73	2	3	25	75	100	3
	III	AS23C03	Ecology and Embryology	CC	4	58	2	3	25	75	100	4
		AS24CP2	Zoology Practical II	CC	-	-	-	-	-	-	-	-
		PL24A01	Fundamentals of Botany I	GE	5	73	2	3	20	55	75	4
		TH24A19	Mathematics for Sciences I	GE	7	103	2	3	25	75	100	5
		PL23AP1	Botany Practical I	GE	2	30	-	-	-	-	-	-
		AS24SB01	Medical Coding	DSE/SEC	3	41	4	-	100	-	100	3
	IV	NM23DTG	Design Thinking	AEC	2	30	-	-	100	-	100	2
I-III	VI	COM15SER	Community Services 30 hours	GC	-	-	-	-	-	-	-	-
I-V	VI	24BONL 1 24BONL 2 24BONL 3	Online Course I Online Course II Online Course III	ACC	-	-	-	-	-	-	-	-

L – Language
E - English
CC – Core Courses
GE – Generic Elective
DSE –Discipline Specific Elective
SEC- Skill Enhancement Course
AEC – Ability Enhancement Course
GC- General Courses
ACC-Additional Credit Course
CA – Continuous Assessment
ESE - End Semester Examination

QUESTION PAPER PATTERN

Examination System

One test for continuous assessment will be conducted on pre-determined dates i.e., commencing on the 50th day from the date of reopening. The Model exam will be conducted after completing 85th working days. Marks for ESE and CA with reference to the maximum for the courses will be as follows:

2023-2026 BATCH & ONWARDS

CA Question Paper Pattern and distribution of marks UG
Language and English
Section A 5 × 1 (No choice) : 5 Marks
Section B 4 × 5 (4 out of 6) : 20 Marks (250 words)
Section C 2 × 10 (2 out of 3): 20 Marks (500 words)
Total : 45 Marks

Core and Allied - (First 3 Units)

CA Question from each unit comprising of

One question with a weightage of 2 Marks (No choice) : 2 × 3 = 6
One question with a weightage of 5 Marks (Internal Choice at the same CLO level) : 5 × 3 =15
One question with a weightage of 8 Marks (Internal Choice at the same CLO level) : 8 × 3 =24
Total : 45 Marks

End Semester Examination – Question Paper Pattern and Distribution of Marks
Language and English
Section A 10 × 1 (10 out of 12) : 10 Marks
Section B 5 × 5 (5 out of 7) : 25 Marks (250 words)
Section A 4 × 10 (4 out of 6) : 40 Marks (600 - 700 words)
Total : 75 Marks

Core and Allied courses:
ESE Question Paper Pattern: 5 × 15 = 75 Marks
Question from each unit comprising of
One question with a weightage of 2 Marks : 2 × 5=10
One question with a weightage of 5 Marks (Internal Choice at the same CLO level): 5 × 5 =25
One question with a weightage of 8 Marks (Internal Choice at the same CLO level): 8 × 5 =40

Continuous Internal Assessment Pattern

Theory

II Year UG (24 Batch)

CIA Test : 5 marks (conducted for 45 marks after 50 days)
Model Exam : 7 marks(Conducted for 75 marks after 85 days (Each Unit 15 Marks))
Seminar/Assignment/Quiz : 5 marks
Class Participation : 5 marks
Attendance : 3 marks
Total : 25 Marks

Practical

Lab Performance : 7 marks
Regularity : 5 marks
Model Exam : 10 marks
Attendance : 3 marks
Total : 25 marks

ESE Practical Pattern

The End Semester Examination will be conducted for a maximum of 75 marks respectively with a maximum 15 marks for the record and other submissions if any.

Part IV

Foundation Course – NM23DTG-Design Thinking
Quiz : 50 marks
Assignment : 25 marks
Project / Case study : 25 marks
Total : 100 Marks

ATTENDANCE: 3 Marks (Attendance 75% - 80%- 1 Mark, 81% - 90% - 2 Mark, 91%-100% - 3 Mark)

MAPPING OF PLOS WITH CLOS

COURSE	PROGRAMME LEARNING OUTCOMES				
	PLO1	PLO2	PLO3	PLO4	PLO5
COURSE – AS23CO3					
CLO1	S	S	M	M	L
CLO2	S	S	M	M	M
CLO3	S	S	S	S	M
CLO4	S	S	S	S	M
COURSE – AS23CP2					
CLO1	S	S	S	S	S
CLO2	S	S	S	S	S
CLO3	S	S	S	S	S
CLO4	S	S	S	S	S

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
AS23CO3	ECOLOGY AND EMBRYOLOGY	Core	58	2	-	4

Preamble

To understand the basic concepts of ecology & Embryology and to understand the functional details of environments and embryo & its stages.

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the basic aspects of ecology and Gametogenesis, Organogenesis in frog and Human Reproduction.	K_1
CLO2	Understand the concepts of ecological attributes and physiological processes in Embryology that are distinct and significant	K_2
CLO3	Apply the systemic and functional morphology of various aspects of ecology and embryology	K_3
CLO4	Analyze the general and specific characteristics within and other environments in relation to abiotic & biotic factors, stages and development of an embryo	K_4

Mapping with Programme Outcomes

CLO	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	L	S	M	M	S
CLO2	S	S	M	M	S
CLO3	S	S	S	S	M
CLO4	S	S	S	S	M

S- Strong; M-Medium; L-Low

ECOLOGY AND EMBRYOLOGY – AS23CO3 **58 Hrs**

Syllabus

Unit I **11 Hrs**

Scope of Environmental Biology, Abiotic factors – Soil, Water, Light,Temperature. Biotic Factors, *__Animal Relationships: Symbiosis, Mutualism, Commensalism, Antagonism, Parasitism, Predation,Competition__, Population attributes: natality, mortality, population growth, population density, growth curves, Age pyramids, Biotic potential, Population regulation. *__Biogeochemical cycles–Carbon, Oxygen, Nitrogen, Phosphorus and Sulphur cycles.__

Unit II **11 Hrs**

Community ecology – Definition, Types and Characteristics of community, Ecotone and Edge Effect, Ecological niche, Concepts of community, Ecological succession- sere and climax, Significance of succession. Habitat ecology – *__Marine Habitat-Definition, Stratification__, Pelagic region – communities, plankton, Pelagic adaptations; Intertidal seashore – rocky, muddy, sandy – biota and adaptations. *__Mangroves –Definition, Mangrove fauna and flora, Ecological conditions of mangroves.__

Unit III **12 Hrs**

Scope of Developmental Biology-definition, sub-divisions (Descriptive, Comparative, Experimental and Chemical). Early history of embryology.(Preformation and Epigenesis, Recapitulation theory or Biogenetic law, Germplasm theory (Weisman). *__Gametogenesis-Spermatogenesis –Spermiogenesis, Structure and types of sperms; Oogenesis- Growth of oocyte, vitellogenesis__, organization of egg cytoplasm, Polarity and Symmetry, Maturation of egg, egg envelopes, Structure of Ovum; *__Fertilization-Definition , External and internal fertilization, Mechanism of fertilization.__ Cleavage-Patterns of cleavage-radial, spiral and bilateral; Types of cleavage - meroblastic and holoblastic. Blastulation-Types of Blastula; Fate map of frog , Gastrulation in frog. Morphogenetic movements-epiboly and emboly.*__Types of eggs.__

Unit IV **12 Hrs**

Organogenesis in frog – Development of eye,ear ,brain & heart.Organizer concept: Embryonic Induction, Role of organizers in development- Transplantation experiments of Spemann and Mangold. Chemistry of organizers. Extra-embryonic membranes in chick. *__Placentation in mammals-Classification of placenta based on Nature of contact,Mode of implantation,Histological intimacy of foetal and maternal tissue.Functions of placenta. * Metamorphosis in frog, Regeneration__

Unit V **12 Hrs**

*__Human Reproduction: Puberty, *Menstrual cycle, Reproductive Hormones Menopause, Pregnancy, Parturition, Lactation, Infertility__, Artificial insemination, Cryopreservation, Embryo transfer, Amniocentesis, Artificial Reproductive Technology-. ZIFT, GIFT and IVF. Birds eye view of stem cells. * __In vitro fertilization and its ethics__.

*** Denotes Blended Learning**

TEXT BOOKS

S. No.	Author	Title of the Book	Publisher	Year & Edition
1	Arumugam, N	A Text Book of Embryology	Saras Publication	2003, 2nd Edn.
2	Verma P.S., Agarwal., V.K	Environmental Biology	S. Chand & Company	2000, 8th Edn.

REFERENCE BOOKS

S. No.	Author	Title of the Book	Publisher	Year & Edition
1	Balinsky, B.I	Introduction to Embryology	Saunders College Publishing	1981, 5th Edn.
2	Berrill, N.J	Developmental Biology	Tata Mc Graw Hill Publication Co.Ltd	1986, 2nd Edn.
3	Clarke,G.L.	Elements of Ecology	John Wiley & Son Inc. New York & London	1954, 1st Edn.
4	Kotpal,R.L. and Bali,N.P.	Concepts of Ecology	Vishal Publication, Delhi	1986, 1st Edn.
5	Odum, E.P.	Basic Ecology	Saunders College Publishing , New York	1983, 2nd Edn.
6	Scott F. Gilbert,	Developmental Biology	Sinauer Associates, Inc. Publishers, Sunderland, Massachusetts	1997, 5th Edn.
7	Vijayaraghavan Nair K & P.V. George	A Manual of Developmental Biology	Academica	-
8	Vincent Terrence Robello, John P.C. and Prema A K	Developmental Biology	Zoological Society Study Material Series, Zoological Society of Kerala, Kottayam	2012, 1st Edn.

Pedagogy: Chalk and talk, PPT, e-content, group discussion, assignment, quiz, peer learning, seminar

Course Designers

1. Dr. G. Sasikala
2. Dr. M. Sheeba

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
AS23CP2	ZOOLOGY PRACTICAL II	Practical	-	-	90	4

Preamble

To provide practical knowledge on cell biology, environmental and developmental biology and to develop practical biological skills.

Course Learning Outcomes

On the successful completion of the course, students will be able to:

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the basic concepts biology-based knowledge on the life of animal forms and the environment. To understand the concepts of natural habitats and the effects of ecological parameters. To understand the process by which organisms grow and develop	K_1
CLO2	Understand the components of the ecosystem and their interactions and inter-relationships to sustain life on earth. Analyse the different ecological parameters and to analyse the mechanisms that intervene in developmental alterations	K_2
CLO3	Application of the acquired skills and adopting it for future research	K_3
CLO4	Analyze the practical knowledge on cell biology, environmental and developmental biology and develop practical biological skills	K_4

Mapping with Programme Outcomes

CLO	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	L	S	S	S	S
CLO2	S	M	S	S	S
CLO3	S	S	M	S	M
CLO4	S	S	S	S	S

S- Strong; M-Medium; L-Low

ZOOLOGY PRACTICAL II – AS23CP2 **90 Hrs**

Syllabus

CELL BIOLOGY **12 Hrs**

1. Squash preparation of onion root tip.
2. Mounting of giant chromosomes in Drosophila larva

BIOCHEMISTRY **6 Hrs**

1. Qualitative analysis of carbohydrates, proteins and lipids.

ENVIRONMENTAL BIOLOGY **42 Hrs**

1. Estimation of dissolved oxygen in water samples by Winkler's method.
2. Estimation of salinity, pH and temperature in water samples.
3. Estimation of free carbon dioxide in water samples.
4. Mounting and identification of Marine and Fresh water plankton.
5. Identification and study of inter tidal, rocky sandy and muddy shore fauna.
6. Estimation of total alkalinity of water.
7. Estimation of total hardness of water.
8. Trip to a terrestrial ecosystem

DEVELOPMENTAL BIOLOGY **30 Hrs**

Spotters

1. Observation of different types of eggs – Amphioxus, frog, hen's egg, ovum of mammal
2. Observation of different types of sperms- Sperm of frog, sperm of man.
3. Embryology of Frog – Cleavage, Blastula, Gastrula, Yolk plug.
4. Chick embryo whole mount – 24, 48, 72 & 96 hours.
5. Metamorphosis in frog.
6. Placenta of mammals - pig, sheep and man.

REFERENCE BOOKS

S. No.	Author	Title of the Book	Publisher	Year & Edition
1	Sinha. J, Chatterjee. A. K, Chattopadhyay. P	Advanced Zoology Practical	Arunabha Sen Books and Allied (P) Ltd	2011, 1st Edn.
2	Lal S. S., A	Textbook of Practical Zoology Vertebrate	Rastogi Publication	2004, 3rd Edn.
3	Lal S. S., A	Textbook of Practical Zoology Invertebrate	Rastogi Publication	2004, 3rd Edn.

Pedagogy: Demonstration, practical, dissection, slides, spotters, field visit, culture methods, power point presentation, e-content, group discussion.

Course Designers

1. Dr. G. Sasikala
2. Dr. M. Sheeba

COURSE CODE	COURSE TITLE	Category	L	T	P	Credit
AS24SB01	MEDICAL CODING	Theory	41	4	-	3

Preamble

Medical coding is a vital component of the modern healthcare ecosystem, ensuring accurate documentation, efficient billing, and effective communication across providers and insurers. This course introduces the foundational concepts and practical skills necessary for aspiring medical coders.

Course Learning Outcomes

On the successful completion of the course, students will be able to:

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the basic concepts, purpose, and types of medical coding systems including ICD, CPT, and HCPCS.	K1
CLO2	Interpret medical terminology, including common morphemes and terms related to different body systems, the anatomy, functions, and frequently encountered diseases of major organ systems	K2
CLO3	Apply correct ICD-10-CM codes for various diagnoses, signs, symptoms, and external causes based on clinical documentation.	K3
CLO4	Apply billing procedures and identify common issues such as denials, and rejections, and evaluate different career options in medical coding and prepare appropriate resumes and responses for interviews	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	**M**	**M**	**M**	**S**	S
CLO2	**M**	**M**	**M**	S	S
CLO3	**M**	**M**	**S**	**S**	**S**
CLO4	**M**	**M**	**S**	**S**	**S**

S- Strong, M-Medium

MEDICAL CODING - AS24SB01 Hrs

UNIT I: Introduction to Medical Coding & Basic Systems 9 Hrs

Definition and purpose of medical coding, Roles and responsibilities of a medical coder, Types of medical codes: ICD, CPT, HCPCS, Overview of coding process from patient visit to billing, Medical Terminology- Morphemes, Common terminology in various systems, Tips for deciphering medical terms, Digestive System- Anatomy and Functions: digestion, absorption, excretion, Common diseases Diagnostic and procedural terminology, Respiratory System- Anatomy and Functions: gas exchange, respiration regulation, Common conditions and Procedures, Terminology and sample codes.

UNIT II: Major Organ Systems 9 Hrs

Cardiovascular System- Anatomy of the heart and blood vessels, Common diseases, Diagnostic terms and procedures, Common codes used, Musculoskeletal System, Bones, muscles, joints overview, Common conditions, Orthopedic terms and procedures, Coding for injuries and surgeries, Genitourinary System-Male and female reproductive systems, Urinary system components and functions, Common diseases, Diagnostic/procedural terms, Related coding examples, Nervous System-CNS and PNS structure and function, Common conditions, Diagnostic tools, Neurological coding and terminology.

UNIT III: Additional Body Systems 9 Hrs

Integumentary System- Skin, hair, nails, and glands, Common disorders, Biopsy, excision, and dermatological procedures, Related coding examples, Blood & Lymphatic Systems- Blood components and functions Lymph nodes and immune system overview, Related Diseases, Hematology/oncology codes, Endocrine System- Major glands, Hormonal imbalances, Lab tests and common endocrine-related procedures, Coding and medical terminology EENT- Overview of EENT organs, common conditions, Related tests and treatments, Basic coding practices in EENT.

UNIT IV: ICD-10-CM Diagnosis Coding 9 Hrs

ICD-10-CM (International Classification of Diseases, 10th Revision – Clinical Modification) Structure and format of ICD-10-CM, Guidelines for proper use of codes, Coding for: Diseases,

Signs and symptoms, Abnormal findings, External causes, Injuries, Overview of all 22 chapters: Infectious diseases to External causes of morbidity, Examples of correct and incorrect coding.

UNIT V: CPT, HCPCS & Career Prep **9 Hrs**

CPT (Current Procedural Terminology), Introduction to CPT codes, CPT manual organization (Sections and Subsections), Types of codes, Evaluation & Management (E/M) coding, Surgical procedures and diagnostics, Modifiers, Use of CPT modifiers, Importance in refining code accuracy, Impact on reimbursement, HCPCS (Healthcare Common Procedure Coding System), Levels I and II codes, Durable Medical Equipment (DME) and supplies, Drugs and non-physician services, Billing Guidelines-Insurance claim process, Payers and reimbursement systems, Role of clearinghouses and denials, Job Opportunities & Career Preparation, Career paths: outpatient coder, inpatient coder, auditing, compliance, Common interview questions for coders, Resume tips for coders, Mock interview preparation, Certifications.

Reference Books

S. No.	Authors	Title of the Book	Publishers	Year & Edition
1,	Carol J. Buck	Step-by-Step Medical Coding	Elsevier	2023
2	American Medical Association (AMA)	CPT 2024 Professional Edition	American Medical Association Press	2024
3	American Academy of Professional Coders	ICD-10-CM Expert for Physicians 2024	American Academy of Professional Coders	2024
4	Joanne Valerius, Nenna Bayes, Cynthia Newby	Medical Insurance: An Integrated Claims Process Approach	McGraw-Hill Education	2020
5	American Medical Association	Principles of CPT Coding	American Medical Association	2012, 9th Edn.
6	American Academy of Professional Coders	CPC® Certification Study Guide 2024	AAPC Publishing	2024

Semester : III & IV

Paper : Job Oriented Course

Title : Celebrate Life with Photography - A Mobile Phone Photography Course

Subject Code : JOB2598

Lecture Hours: 60

Preamble

- Impart a good understanding of the Art and Science of Mobile Phone Photography
- Help develop a sense of aesthetics and cultivate creativity
- To help students connect with themselves and the world around them
- Observation skills will make a person more sensitive to whatever is happening in their immediate surroundings and the world at large
- Motivate peer interaction and help students discover the pleasure of working with others

Module 1: Introduction to Mobile Photography

This module will introduce students to the essentials of photography, focusing specifically on the capabilities of mobile devices. Topics will include understanding the camera in a smartphone, working with available light, composition, and colour theory.

Module 2: Advanced Techniques in Mobile Photography

Students will learn about advanced concepts like HDR, panoramas, time-lapses, portraits, and macro photography. They will also be introduced to post-processing apps for mobile devices.

Module 3: Exploring Nature
Description: This module will focus on using mobile phone photography to observe Nature in the context of shapes, forms, colours, and textures.
Assignment: The assignment will be based on the topic for the week
Assessment Criteria: Content, Technique and Aesthetics.

Module 4: Capturing Culture and Heritage
Description: Students will learn how to use mobile photography to document and appreciate diverse cultures, traditions, and architecture in their cities.
Assignment: The assignment will be based on the topic for the week
Assessment Criteria: Content, Interpretation and Aesthetics.

Module 5: Mindful Photography
Description: This module will teach students how photography can be used as a mindfulness tool to appreciate the surroundings and foster a positive mindset.
Assignment: The assignment will be based on the topic for the week
Assessment Criteria: Content, Interpretation and Presentation.

Module 6: Urban Explorations
Description: Students will learn how to use mobile photography to appreciate and capture the aesthetics of urban life, including street art, architecture, urban landscapes, and cityscapes.
Assignment: The assignment will be based on the topic for the week
Assessment Criteria: Content, Technique and Aesthetics.

7. Final Project: Your Mobile Photo Story (Team Project)

In this team Photo Story project, students will be required to capture captivating narratives through the lens of their cameras. Each team will identify an underlying theme that resonates with them, for example - "Reflections", "Journey", "Contrast", "Connections". Through this collaborative endeavour, students will explore the art of storytelling through photography, using visual imagery to convey compelling narratives that reflect their unique perspectives and experiences.

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
PL24A01	Fundamentals of Botany I	Theory	73	2	-	4

Preamble

- To study the characteristics and life cycle of algae, fungi, bryophytes, pteridophytes, gymnosperms and angiosperms
- To gain knowledge of biodiversity and their conservation
- To learn the horticulture techniques.

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CO Statement	Knowledge Level
CLO1	Know about characteristics and life cycle of algae, fungi, bryophytes, pteridophytes, gymnosperms	K1
CLO2	Know about characteristics and life cycle of angiosperms	K2
CLO3	Understand the concept of Plant Ecology, Biodiversity and their conservation	K3
CLO4	Appraise the horticulture techniques.	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	M	M	S	S
CLO2	S	S	M	M	M
CLO3	S	S	S	S	S
CLO4	S	S	S	M	M

S- Strong; M-Medium

Syllabus

Unit I **15 hrs**

General characteristics and classification of Algae (Fritsch-1948) - A study of distribution, structure, reproduction and life cycle of *Volvox.* Economic importance of algae. General characteristics and classification of Fungi (Alexopoulos and Mims, 1979) –A study of distribution, structure, reproduction and life cycle of *Saccharomyces.* Economic importance of Fungi. General characteristics, classification (Zahlbruckner, 1907). Structure and reproduction of Usnea.

Unit II **15 hrs**

General characteristics and Classification of Bryophyte (Reimer, 1954)- Structure, Reproduction and Life cycle of *Riccia.* General characteristics and Classification of Pteridophytes (Sporne, 1975) - Structure, Reproduction and Life cycle of *Lycopodium*. General characteristics and Classification of Gymnosperms (Sporne,1965) - Structure, Reproduction and Life cycle of *Cycas.*

Unit III **15 hrs**

General Characteristics and Classification of Angiosperms (Bentham and Hooker, 1883). Morphology of stem, root, leaf, inflorescence, flower and fruit. Study of the following families with their Economic importance – Annonaceae, Rutaceae, Rubiaceae, Lamiaceae, Amarantaceae and Poaceae.

Unit- IV **14 hrs**

Ecology- Population and Community Ecology, Ecosystem-Definition, components-food chain, food web, ecological pyramid. Morphological and physiological adaptations of Xerophytes, Mesophytes, Hydrophytes. Biodiversity- definition; Scope & importance; loss of biodiversity and Conservation of Biodiversity-In-situ & Ex-situ conservation

Unit V **14 hrs**

Horticulture: scope and importance, irrigation methods, manures, vegetative propagation methods –cutting, layering and grafting techniques, Gardening and landscaping- lawns, indoor plants, rock garden, terrarium and topiary.

Text Books

S.No.	Authors	Title of the book	Publishers	Year of publication & Edition
1.	Srivastava, H.N	Algae	Pradeep Publications, Delhi	2004, X Edn
2.	Srivastava, H.N.	Fungi	Pradeep Publications, Delhi	2004, X Edn
3.	Srivastava, H.N.	Pteridophytes	Pradeep Publications, Delhi	2004, X Edn
4.	Pandey, P.B	Plant Anatomy	S. Chand & Co, New Delhi	2001, I Edn
5.	Singh, V. and Jain	Taxonomy of Angiosperms	Rastogi Publications, New Delhi	1985, II Edn
6.	Purohit S.S &Ranjan .R	Ecology, Environment and Pollution	Agrobios, India,Jodhpur	2003, I Edn

Reference Books

S.No	Authors	Title of the book	Publishers	Year of publication & Edition
1.	Sharma O.P.	Plant Taxonomy	Tata McGraw Hill Comp, New Delhi	2018, II Edn
2.	Pandey, B. P.	Taxonomy of Angiosperms	S. Chand & Co, New Delhi	2015, VI Edn

Pedagogy: Powerpoint, lecture, seminar, quiz and discussion.

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
PL23AP1	Botany Practical	Practical	-	-	60	2

Preamble

- To observe and identify the different types of Algae, Fungi, Bryophytes, Pteridophytes and Gymnosperms.
- To obtain knowledge on anatomy of plants.

Course learning outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Differentiate the different forms of Algae, Fungi, Bryophytes, Pteridophytes and Gymnosperms.	K1
CLO2	Preparation of culture media.	K2
CLO3	Illustrate the internal structure of plant tissues.	K3
CLO4	Analyse the various pigments in plants	K3

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1.	M	S	M	M	M
CLO2.	S	S	M	S	S
CLO3.	M	M	M	M	M
CLO4.	S	S	S	S	M

S- Strong; M-Medium

Syllabus

Semester- III **30 hrs**

Specimens

Bryophytes - Habit of *Riccia*

Pteridophytes - Habit of *Lycopodium cernum, L. clavatum, L. phlegmaria* Gymnosperms - Habit of *Cycas*, Male cone, Female cone

Taxonomy - Study of plants belonging to the families (Annonaceae, Rutaceae, Rubiaceae, Lamiaceae, Amaranthaceae, and Poaceae) and their economic importance

Ecology- Habit of *Nerium, Opuntia, Helianthus, Hibiscus,Hydrilla, Nelumbium*

Slides

Algae - *Volvox*- Daughter colonies, Oogonia and Antheridia. Fungi - *Saccharomyces*-Single cell structure

Bryophytes - *Riccia*- Reproductive Structures-Antheridium, Archegonium and Sporangium
Pteridophytes - *Lycopodium*- L.S. of Cone
Gymnosperms - *Cycas*- T.S. of Corolloid root

Sectioning

Bryophytes - *Riccia*- T.S. of Thallus
Pteridophytes - *Lycopodium*- T.S.of Stem
Gymnosperms - *Cycas* - T.S. of Leaflet, T.S. of Rachis

Demonstration – cutting, layering, Grafting and bonsai

Semester- IV **30 hrs**

Slides

Anatomy - Simple Tissues (Parenchyma, Collenchyma and Sclerenchyma), Complex Tissues (Xylem and Phloem)
Embryology- T.S. of Mature anther, 8- nucleated Embryo sac, Mature Embryo

Sectioning

Anatomy- Primary structure of Dicot stem, root and leaf Primary structures of Monocot stem and root

Experiments

Physiology - Determination of osmotic potential by Plasmolytic method
Separation of leaf pigment by Paper chromatography
Microbiology- Preparation of Potato Dextrose Agar Medium, Serial dilution techniques and culture techniques –Pour plate, spread plate, streak plate & slant

Demonstration Experiments

Physiology – hill reaction
Tissue culture – sterilization, preparation of MS medium, inoculation, callus induction and organogenesis
Spotters Microbiology – Fermentor

Course Designers

Dr.C.Krishnaveni
Dr. R. Sumathi
Dr.E.Uma

COURSE CODE	COURSE TITLE	Category	L	T	P	Credits
TH24A19	MATHEMATICS FOR SCIENCES I	Theory	103	2	-	5

Preamble

- To inspire the students to use appropriate and relevant, fundamental and applied mathematical knowledge.
- To explore how Chemistry and Mathematics interact with other disciplines withindustry and with wider society.

Prerequisite

- Knowledge in Calculus and Set theory.

Course Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the important quantities associated with vector fields such as divergence, curl and scalar potential and concepts in matrices, set theory and equivalence relations	K1
CLO2	Understanding the various concepts of line integrals and Laplace transform of one variable through problems.	K2
CLO3	Applying fundamental theorem of line integrals, Green's theorem, Stoke's theorem and Divergence theorem to evaluate integrals	K3
CLO4	Demonstrate knowledge of basic concepts such as Abelian groups, normal subgroups, quotient groups , cyclic groups , permutation groups and group actions	K4

Mapping with Programme Outcomes

CLOs/ PLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1	S	S	S	M	S	S
CLO2	S	M	S	S	S	S
CLO3	S	S	S	M	S	S
CLO4	S	S	M	S	S	S

S- Strong; M-Medium

Syllabus

MATHEMATICS FOR SCIENCES I

Credits:5 **Hours:103**

UNIT I **21Hrs**

Vector Calculus: Scalar and Vector point functions - Differentiation of vectors - Differential Operators - Directional derivative: Gradient - Divergence and curl - MAPLE Applications - Stepwise Solutions of Vector Calculus.

UNIT II 20Hrs

Integration for vectors : Line, surface and volume integrals - Theorems of Gauss, Green's and Stoke's(statements only) – *Verification with MAPLE Applications* – Stoke's problem.

UNIT III 21Hrs

Laplace Transforms:Definition–Laplace Transform of e^{at}, cosat, sinat, coshat, sinhat, t^n, n is a positive integer–, $L[f^n(t)]$ – Laplace transform of e^{at}cosbt ,e^{at}sinbt and $e^{at}t^n$–Inverse Laplace Transforms of standard functions-Solving differential equations of second order with constant coefficients using Laplace transform.

UNIT IV 20Hrs

Matrices:Eigen values and eigen vectors-Cayley Hamilton theorem(with out proof) – Verification – Finding the inverse of a matrix (Using Cayley Hamilton theorem).

UNIT V 21 Hrs

Review of Set theory and equivalence relations – Group – Properties - Order of an element – Subgroups - Cyclic groups – Theorems – Permutation group - Symmetric group Sn.

Text Books

S. No	Author	Title of the book	Publishers	Year & Edition
1	P.Kandasamy&K.Thilagavathy	Allied Mathematics Volume II (For Unit I ,II)	S.Chand& company Ltd.	2004, 1st Edn.
2	T.K.ManicavachagamPillai and S. Narayanan	Ancillary Mathematics (For Unit III & IV) Volume I & Volume II	S.Viswanathan (Printers and Publishers) Pvt. Ltd.	Vol-I -2008 Vol- II - 2009
3	P.Kandasamy&K.Thilagavathy	Allied Mathematics Volume II (For Unit V)	S Chand & Company Ltd.	2004, 1st Edn.

4	http://www.maplesoft.com/applications/			

Unit I&II	:	Chapters 1 to 3
Unit III	:	Chapter 7 Volume II
Unit IV	:	Chapter 3 Volume I
Unit V	:	Group Theory Chapters 1 to 4 (Volume II)

Reference Books

S. No	Author	Title of the book	Publishers	Year & Edition
1	P.Durai Pandian and KayalalPachaiyappa	Vector Analysis	S Chand Publications	2014 , 1st Edn.
2	Shanthinarayan nd P.K. Mital	Vector Calculus	S Chand publications	2016 , 4th Edn.
3	P.C. Mathews	Vector Calculus	Springer Verlang London Ltd.	1998 , 7th Edn.
4	G. Balaji	Transforms and a nd Partialdifferential equations	G. Balaji publishers, Revised edition	2011, Revised Edn.

Note

Question paper setters to confine to the above text books only.

E- Content

1) Scalar and Vector point functions:
https://www.youtube.com/watch?v=uanWfSQ6cq8&ab

2) Line, surface and volume integrals:
https://www.youtube.com/watch?v=NyG0vRn5FfU&ab

3) Inverse Laplace Transforms of standard functions:
https://www.youtube.com/watch?v=Y8GXpS31CGI&ab

4) Eigen values and eigen vectors:
https://www.youtube.com/watch?v=PFDu9oVAE-g&ab

5) Review of Set theory and equivalence relations:
https://www.youtube.com/watch?v=IZzEiuY-c2M&ab

Name of the course	Allied Mathematics for Sciences I
Name of the Faculty	Dr.S. Deepa
Participatory Learning	30 %
Experiential Learning	30 %
Problem-based Learning	40 %

CourseDesigners:

1. Dr.K.Sumathi, Associate Professor and Head, Department of Mathematics
2. Ms. Sharmilaa, K, Associate Professor, Department of Mathematics

PSGR
Krishnammal College for Women
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DEPARTMENT OF ZOOLOGY

CHOICE BASED CREDIT SYSTEM (CBCS) &
LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK (LOCF)

BACHELOR OF SCIENCE - ZOOLOGY
2024 – 2027 BATCH
IV SEMESTER

PROGRAMME LEARNING OUTCOMES (PLOs)

After completion of the programme, the student will be able to:

PLO1: Appreciate the complexities of various levels of organization in the living forms and address controversial biological issues in a scientific way

PLO2: Imbibe transformational impact on the quality of education, and to adopt scientific temper and live with scientific values

PLO3: Assess the scope of animal biology, opt relevant areas for inter-disciplinary and trans-disciplinary studies

PLO4: Understand and apply the core strands of the knowledge acquired in various disciplines of life sciences to become a potential entrepreneur

PLO5: Acquire quality life science education to turn into an outstanding researcher/teacher/career woman/entrepreneur and a responsible citizen

PROGRAMME SPECIFIC OUTCOME (PSO's)

The students at the time of graduation will:

PSO1: Gain the knowledge of Zoology through theory and practical

PSO2: Analyze the relationships among animals with their ecosystems

PSO3: Learn to classify the major groups of organisms under different phyla, understanding the functioning of organisms, compare and contrast anatomical and physiological characteristics of animals

PSO4: Understand good laboratory practices as per laboratory standards, handling the sophisticated instruments/equipment to develop technical skills, research oriented skills about research methodologies, effective communication and skills of problem solving methods

PSO5: Understand the applications of zoological knowledge in Agriculture, Medical and daily life and apply the knowledge for employment - Indian Forest Service, Sericulture, Fisheries, Veterinary, Clinical Laboratory, Museum Curator, Departments and Entrepreneurship. They can go for Indian Forest Service and other competitive examinations

BACHELOR OF SCIENCE - ZOOLOGY
CHOICE BASED CREDIT SYSTEM (CBCS) &
LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK (LOCF)
SYLLABUS & SCHEME OF EXAMINATION
2024-2027 BATCH
SEMESTER IV

Sem	Part	Course code	Title of the Course	Course type	Instruction Hours/Week	Contact Hours	Tutorial	Duration of Examination	Examination Marks			Credits
									CA	ESE	Total	
IV	I	TAM2304/ HIN2304/ FRE2304	Tamil Paper IV/ Hindi Paper IV/ French Paper IV	L	5	73	2	3	25	75	100	3
	II	ENG2404	English Paper IV	E	6	88	2	3	25	75	100	3
	III	AS23C04	Cell Biology and Biochemistry	CC	4	58	2	3	25	75	100	4
		AS23CP2	Zoology Practical II	CC	3	45	-	3	25	75	100	4
		PL23A02/ TH24A25	Fundamentals of Botany II/ Mathematics for Sciences II	GE	5/ 7	73/ 103	2	3	20/25	55/75	75/100	4/5
		PL23AP1	Botany Practical	GE	2	30	-	3	15	35	50	2
		AS23SCE1	Insect-Human Interactions	SEC	3	45	-	-	100	-	100	3
		NM23EII	Entrepreneurship and Innovation (IgniteX)	AECC	2	30	-	-	100	-	100	2
	IV	NM24EVS	Environmental Studies	AECC	SS	-	-	-	100	-	100	Gr.
IV	V	COCOACT	Co-Curricular Activities	GC	-	-		-	100	-	100	1
I-V	VI	24BONL 1 24BONL 2 24BONL 3	Online Course I Online Course II Online Course III	ACC	-	-	-	-	-	-	-	-

L – Language
E - English
CC – Core Courses
GE – Generic Elective
SEC- Skill Enhancement Course
AECC – Ability Enhancement Course
GC- General Courses
ACC-Additional Credit Course
CA – Continuous Assessment
ESE - End Semester Examination

Examination System

Pattern:

Semester system will be followed. A semester consists of a minimum of 90 working days excluding the days of conduct of ESE. There will be Continuous Internal Assessment (CA) to evaluate the performance of students in each course and the End Semester Examination will be held at the end of every semester.

Weightage assigned to various components of Continuous Internal Assessment

Theory

CIA Test	: 5 marks (conducted for 45 marks after 50 days)
Model Exam	: 7 marks (conducted for 75 marks after 85 days)
Seminar/Assignment/Quiz	: 5 marks
Class Participation	: 5 marks
Attendance	: 3 marks
Total	**: 25 Marks**

Practical

Lab Performance	: 7 marks
Regularity	: 5 marks
Model Exam	: 10 marks
Attendance	: 3 marks
Total	**: 25 marks**

CA - Question Paper Pattern and Distribution of Marks

Language and English

Section A 5 × 1 (No choice)	: 5 Marks
Section B 4 × 5 (4 out of 6)	: 20 Marks (250 words)
Section C 2 × 10 (2 out of 3)	: 20 Marks (500 words)
Total	**: 45 Marks**

Core and Allied (first 3 units)

CA Question Paper Pattern: 3 × 15 = 45 Marks

CA Question from each unit comprising of

One question with a weightage of 2 Marks: 2 × 3 = 6

One question with a weightage of 5 Marks (Internal Choice at the same CLO level): 5 × 3 = 15

One question with a weightage of 8 Marks (Internal Choice at the same CLO level): 8 × 3 = 24

Skill Based Subject Theory Courses

Test I	: 30 Marks (conducted for 50 Marks and converted to 30 Marks)
Test II	: 50 Marks
Assignment	: 10 Marks
Seminar	: 10 Marks
TOTAL	**: 100 Marks**

Students securing very low marks in internal assessment, only ESE marks will be considered as passing criteria from the third attempt and onwards

End Semester Examination – Question Paper Pattern and Distribution of Marks

Language and English

Section A	10 × 1 (10 out of 12)	: 10 Marks
Section B	5 × 5 (5 out of 7)	: 25 Marks (250 words)
Section A	4 × 10 (4 out of 6)	: 40 Marks (600 - 700 words)
Total		**: 75 Marks**

Core and Allied

ESE Question Paper Pattern: 5 × 15 = 75 Marks

Question from each unit comprising of

One question with a weightage of 2 Marks : 2 × 5 = 10

One question with a weightage of 5 Marks (Internal Choice at the same CLO level): 5 × 5 = 25

One question with a weightage of 8 Marks (Internal Choice at the same CLO level): 8 × 5 = 40

Part IV

Foundation Course – NM23EII - **Entrepreneurship and Innovation (Ignite X)**

Components	Marks
3 Quizzes (25 questions in each Quiz)	50
30 Venture Activities (Assignment)	30
Milestone 3 (pilot deck presentation	20
Total	**100**

Foundation Course – NM24EVS – **Environmental Studies**

Quiz	: 50 marks
Assignment	: 25 marks
Project / Case study	: 25 marks
Total	**: 100 Marks**

Criteria for Attendance:

3 Marks (Attendance 75% - 80% - 1 Marks, 81% - 90% - 2 Marks, 91% - 100% - 3 Marks)

MAPPING OF PLOS WITH CLOS

COURSE	PROGRAMME LEARNING OUTCOMES				
	PLO1	PLO2	PLO3	PLO4	PLO5
COURSE – AS23C04					
CLO1	S	S	S	M	M
CLO2	S	S	S	M	M
CLO3	S	S	S	S	S
CLO4	M	S	S	S	S
COURSE – AS23CP2					
CLO1	S	S	S	S	S
CLO2	S	S	S	S	S
CLO3	S	S	S	S	S
CLO4	S	S	S	S	S

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
AS23C04	CELL BIOLOGY AND BIOCHEMISTRY	THEORY	58	2	-	4

Preamble

To enable the students to explore the intricacies of cell architecture and their complex biochemical interactions.

Course Learning Outcomes

On the successful completion of the course, students will be able to:

CLO Number	CLO Statement	Knowledge Level
CLO1	Impart knowledge about different areas of cell biology, including cell structure, functions, its organelles and fundamentals of biochemical sciences.	K1
CLO2	Develop a comprehensive understanding of the cellular membranes and Matrices	K2
CLO3	Ability to make connections between the molecular mechanisms, holistic understanding of biological organisation and function from the molecules to cells, tissues, organs and entire organism	K3
CLO4	Interpret and evaluate evidence for hypotheses about cell structure and function	K4

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	S	M	M
CLO2	S	S	S	M	M
CLO3	S	S	S	S	S
CLO4	M	S	S	S	S

S- Strong; M- Medium

CELL BIOLOGY AND BIOCHEMISTRY – AS23C04 (58 Hrs)

UNIT I (13 Hrs)

Diversity of cell size and shape. Cell theory, Protoplasm theory. Basic properties of cells; Different classes of cells – Prokaryotic and eukaryotic cells, Various models of plasma membrane structure and function. Microscopes – Principle and Uses of Light microscope, Phase Contrast and Electron Microscope.

UNIT II (11 Hrs)

Structure and Functions: Endoplasmic Reticulum, Golgi apparatus, Lysosomes, ribosomes. Centrioles, Mitochondria – Structure and Functions - Glycolysis, Krebs cycle and oxidative phosphorylation.

UNIT III (11 Hrs)

Structure of Nucleus: Nuclear envelope, nucleolus, functions. DNA – Structure, Watson and Crick model, Replication, super coiling. DNA Repair Mechanism.Giant chromosomes – polytene, lamp brush chromosomes.

UNIT IV (11 Hrs)

RNA - Structure, Types, tRNA structure, Transcription and translation. Cell cycle and its regulation - Mitosis, Meiosis.Cancer – Types and Properties of Cancer Cells; Theories on Carcinogenesis.

UNIT V (12 Hrs)

Scope of Biochemistry–Proteins– Types of Aminoacids, Primary, Secondary, Tertiary, quaternary Structure of Proteins and functions. Classification of carbohydrates. Structure and functions. Lipids classification, structure and functions. Enzymes classification, Michaelis–Menten Equation.Enzyme action – Factors Affecting Enzyme Action, Mechanism of Enzyme Action.

TEXT BOOKS

S. No.	Author	Title of the Book	Publisher	Year and Edition
1	Ambika Shanmugam, K. Ramadevi	Fundamentals of Biochemistry for Medical Students	Wolters Kluwer (India) Pvt. Ltd	2016 and 8th Edn.
2	Verma, P. S. & Agarwal, V. K.	Cell Biology	S. Chand & Company	2022 and 1st Edn.
3	Veer Bala Rastogi	Introduction to Cytology	Kedar Nath Ram Nath Publication	2018 and 1st Edn.

REFERENCE BOOKS

S. No.	Author	Title of the Book	Publisher	Year and Edition
1	Nelson, D. L. & Cox, M. M. (Lehninger)	Lehninger Principles of Biochemistry	W. H. Freeman & Co. Ltd.	2021 and 9th Edn.
2	De Robertis, E. D. P. & De Robertis, E. M. F.	Cell and Molecular Biology	Lippincott Williams & Wilkins	2010 and 8th Edn.
3	U. Satyanarayana & U. Chakrapani	Biochemistry	CBS Publishers & Distributors	2025 and 7th Edn.
4	G. Karp	Karp's Cell and Molecular Biology: Concepts & Experiments	John Wiley & Sons, Inc.	2020 and 9th Edn.

Pedagogy

- Chalk and Talk method, Seminar, Quiz, Group discussion, Power point presentation

Course Designers

1. Dr. P.B. Harathi
2. Dr. M. Sheeba

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
AS23CP2	ZOOLOGY PRACTICAL II	PRACTICAL	-	-	90	4

Preamble

To provide practical knowledge on cell biology, environmental and developmental biology and to develop practical biological skills.

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Recall the basic concepts biology-based knowledge on the life of animal forms and the environment. To understand the concepts of natural habitats and the effects of ecological parameters. To understand the process by which organisms grow and develop	K1
CLO2	Understand the components of the ecosystem and their interactions and inter-relationships to sustain life on earth and analyse the different ecological parameters and to analyse the mechanisms that intervene in developmental alterations	K2
CLO3	Apply the acquired skills and adopting it for future research	K3
CLO4	Analyze the practical knowledge on cell biology, environmental and developmental biology and develop practical biological skills	K4

Mapping with Programme Learning Outcomes

CLO	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	S	S	S	S	S
CLO2	S	M	S	S	S
CLO3	S	S	M	S	M
CLO4	S	S	S	S	S

S- Strong; M-Medium

ZOOLOGY PRACTICAL II – AS23CP2 **90 Hrs**

CELL BIOLOGY **12 Hrs**

1. Squash preparation of onion root tip.
2. Mounting of giant chromosomes in Drosophila larva

BIOCHEMISTRY **6 Hrs**

1. Qualitative analysis of carbohydrates, proteins and lipids.

ENVIRONMENTAL BIOLOGY **42 Hrs**

1. Estimation of dissolved oxygen in water samples by Winkler's method.
2. Estimation of salinity, pH and temperature in water samples.
3. Estimation of free carbon dioxide in water samples.
4. Mounting and identification of Marine and Fresh water plankton.
5. Identification and study of inter tidal, rocky sandy and muddy shore fauna.
6. Estimation of total alkalinity of water.
7. Estimation of total hardness of water.
8. Trip to a terrestrial ecosystem

DEVELOPMENTAL BIOLOGY **30 Hrs**

Spotters

1. Observation of different types of eggs – Amphioxus, frog, hen's egg, ovum of mammal
2. Observation of different types of sperms- Sperm of frog, sperm of man.
3. Embryology of Frog – Cleavage, Blastula, Gastrula, Yolk plug.
4. Chick embryo whole mount – 24, 48, 72 & 96 hours.
5. Metamorphosis in frog.
6. Placenta of mammals - pig, sheep and man.

REFERENCE BOOKS

S. No.	Author	Title of the Book	Publisher	Year and Edition
1	Sinha. J, Chatterjee. A. K, Chattopadhyay. P	Advanced Zoology Practical	Arunabha Sen Books and Allied (P) Ltd	2011 and 1st Edn.
2	Lal S. S., A	Textbook of Practical Zoology Vertebrate	Rastogi Publication	2004 and 3rd Edn.
3	Lal S. S., A	Textbook of Practical Zoology Invertebrate	Rastogi Publication	2004 and 3rd Edn.

Course Designer:

1. Dr. M. Sheeba

Semester : III & IV

Paper : Job Oriented Course

Title : Celebrate Life with Photography - A Mobile Phone Photography Course

Subject Code : JOB2598

Lecture Hours: 60

Preamble

- Impart a good understanding of the Art and Science of Mobile Phone Photography
- Help develop a sense of aesthetics and cultivate creativity
- To help students connect with themselves and the world around them
- Observation skills will make a person more sensitive to whatever is happening in their immediate surroundings and the world at large
- Motivate peer interaction and help students discover the pleasure of working with others

Module 1: Introduction to Mobile Photography

This module will introduce students to the essentials of photography, focusing specifically on the capabilities of mobile devices. Topics will include understanding the camera in a smartphone, working with available light, composition, and colour theory.

Module 2: Advanced Techniques in Mobile Photography

Students will learn about advanced concepts like HDR, panoramas, time-lapses, portraits, and macro photography. They will also be introduced to post-processing apps for mobile devices.

Module 3: Exploring Nature

Description: This module will focus on using mobile phone photography to observe Nature in the context of shapes, forms, colours, and textures.

Assignment: The assignment will be based on the topic for the week

Assessment Criteria: Content, Technique and Aesthetics.

Module 4: Capturing Culture and Heritage

Description: Students will learn how to use mobile photography to document and appreciate diverse cultures, traditions, and architecture in their cities.

Assignment: The assignment will be based on the topic for the week

Assessment Criteria: Content, Interpretation and Aesthetics.

Module 5: Mindful Photography

Description: This module will teach students how photography can be used as a mindfulness tool to appreciate the surroundings and foster a positive mindset.

Assignment: The assignment will be based on the topic for the week

Assessment Criteria: Content, Interpretation and Presentation.

Module 6: Urban Explorations

Description: Students will learn how to use mobile photography to appreciate and capture the aesthetics of urban life, including street art, architecture, urban landscapes, and cityscapes.

Assignment: The assignment will be based on the topic for the week

Assessment Criteria: Content, Technique and Aesthetics.

7. Final Project: Your Mobile Photo Story (Team Project)

In this team Photo Story project, students will be required to capture captivating narratives through the lens of their cameras. Each team will identify an underlying theme that resonates with them, for example - "Reflections", "Journey", "Contrast", "Connections". Through this collaborative endeavour, students will explore the art of storytelling through photography, using visual imagery to convey compelling narratives that reflect their unique perspectives and experiences.

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
PL23A02	Fundamentals of Botany II	Theory	73	2	-	4

Preamble

- To Gain Knowledge of the anatomy of plants
- To Gain Knowledge of the embryology of plants
- To study the metabolism of plants
- To know about the plant tissue culture techniques
- To Gain Knowledge of the microbial techniques

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Appreciate the anatomy of plants	K1
CLO2	Appreciate the embryology of plants	K2
CLO3	Appreciate the metabolism of plants	K3
CLO4	Understand the plant tissue culture techniques	K3

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1.	M	S	M	M	M
CLO2.	S	S	M	S	S
CLO3.	M	M	M	M	M
CLO4.	S	S	S	S	M

S- Strong; M-Medium

Syllabus

Unit I **15 hrs**

A brief account of meristems. Simple and complex permanent tissues Primary structure of dicot and monocot stem, root and leaf; Secondary structure of dicot stem and root.

Unit II **14 hrs**

Microsporogenesis and development of male gametophyte, megasporogenesis and development of female gametophyte, structure of monosporic 8 – nucleate embryo sac (*Polygonum*). Types of endosperm, development of dicot and monocot embryos.

Unit III **15 hrs**

Plant Physiology- osmosis and diffusion. Passive and Active absorption of water, Photosynthesis - Photosynthetic apparatus, light and dark reaction. Transpiration.Plant movements, plant growth regulators –Auxin and Cytokinin.

Unit IV **14 hrs**

Tissue culture: Concept and Techniques– Sterilization, Medium preparation (MS medium), Callus culture, organogenesis and regeneration. Hardening and field transfer.

Unit-V Microbial techniques **15 hrs**

Methods of sterilization, Culture media- PDA, Serial dilution techniques. Pure culture techniques, Microbial growth and Growth curve. Typical Fermentation process.

Text books

S.No	Authors	Title	Publishers	Year and Edition
1.	Tayal, MS	Plant Anatomy	Rastogi Publications	2004 & 3rd Edn.
2.	Singh, V., Pande, PC. and Jain, DK	Anatomy and Embryology of Angiosperms	Rastogi Publications	2018 &3rd Edn.
3.	Jain.V.K	Fundamentals of plant physiology	Chand & Company, New Delhi	2017 & 19th Edn.
4.	Kalyan Kumar, De.	An Introduction to Plant Tissue Culture.	New Central Book Agency Pvt.Ltd. Howrah.	2004 & 1st Edn.
5.	Kumaresan, V	Biotechnology	Saras Publication, Nagercoil, TamilNadu	2017 & 6th Edn.

Reference books

S.No	Authors	Title	Publishers	Year and Edition
1.	Sharma, P.D	Microbiology	Rastogi Publications, Meerut.	2010 & 3rd Edn.
2.	Michael J. Pelczar, E.C.S. Chan and Noel R Krieg.	Microbiology	Mc Graw Hill, New Delhi.	1988 & 5th Edn.

3.	Mukherji.S. and A.K. Ghosh.	Plant Physiology	New Central Book Agency Pvt Ltd. Kolkatta.	2017 & 1st Edn.

Pedagogy:

Powerpoint, lecture, seminar, Assignment, quiz and discussion.

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	CREDIT
PL23AP1	Botany Practical	Practical	-	-	60	2

Preamble

- To observe and identify the different types of Algae, Fungi, Bryophytes, Pteridophytes and Gymnosperms.
- To obtain knowledge on anatomy of plants.

Course learning outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Differentiate the different forms of Algae, Fungi, Bryophytes, Pteridophytes and Gymnosperms.	K1
CLO2	Preparation of culture media.	K2
CLO3	Illustrate the internal structure of plant tissues.	K3
CLO4	Analyse the various pigments in plants	K3

Mapping with Programme Learning Outcomes

CLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1.	M	S	M	M	M
CLO2.	S	S	M	S	S
CLO3.	M	M	M	M	M
CLO4.	S	S	S	S	M

S- Strong; M-Medium

Syllabus

Semester- III **30 hrs**

Specimens

Bryophytes - Habit of *Riccia*

Pteridophytes - Habit of *Lycopodium cernum, L. clavatum, L. phlegmaria* Gymnosperms - Habit of *Cycas*, Male cone, Female cone

Taxonomy - Study of plants belonging to the families (Annonaceae, Rutaceae, Rubiaceae, Lamiaceae, Amaranthaceae, and Poaceae) and their economic importance

Ecology- Habit of *Nerium, Opuntia, Helianthus, Hibiscus,Hydrilla, Nelumbium*

Slides

Algae - *Volvox*- Daughter colonies, Oogonia and Antheridia.

Fungi - *Saccharomyces*-Single cell structure

Bryophytes - *Riccia*- Reproductive Structures-Antheridium, Archegonium and Sporangium

Pteridophytes - *Lycopodium*- L.S. of Cone

Gymnosperms - *Cycas*- T.S. of Corolloid root

Sectioning
Bryophytes - *Riccia*- T.S. of Thallus
Pteridophytes - *Lycopodium*- T.S.of Stem
Gymnosperms - *Cycas* - T.S. of Leaflet, T.S. of Rachis
Demonstration – cutting, layering, Grafting and bonsai

Semester- IV **30 hrs**

Slides
Anatomy - Simple Tissues (Parenchyma, Collenchyma and Sclerenchyma), Complex Tissues (Xylem and Phloem)
Embryology- T.S. of Mature anther, 8- nucleated Embryosac, Mature Embryo

Sectioning
Anatomy- Primary structure of Dicot stem, root and leaf .
Primary structures of Monocot stem and root
Experiments
Physiology - Determination of Osmotic Potential by Plasmolytic method
Separation of Leaf pigment by Paper Chromatography
Microbiology- Preparation of Potato Dextrose Agar Medium,
Serial dilution techniques
Culture techniques –Pour plate, spread plate, streak plate & slant

Demonstration Experiments
Physiology – hill reaction
Tissue culture – sterilization, preparation of MS medium, inoculation, callus induction and organogenesis
Spotters Microbiology – Fermentor

Course Designers
1. Dr.C.Krishnaveni
2. Dr. R. Sumathi
3. Dr.E.Uma

COURSE CODE	COURSE TITLE	Category		T	P	Credit
TH24A25	MATHEMATICS FOR SCIENCES II	Theory	103	2	–	5

Preamble

- To acquaint the students with the tools in Mathematics to problem solving in as many areas as possible.
- To acquire both a conceptual and operational understanding of differential and integral calculus in one and several variables

Prerequisite

- Knowledge in Differential and Integral Equations

Course Learning Outcomes

On the successful completion of the course, students will be able to

Mapping with ProgrammeLearning Outcomes

CLOS/PLOS	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7
CLO1	S	S	S	S	S	S	S
CLO2	S	S	S	S	S	S	S
CLO3	S	S	S	S	S	S	S
CLO4	S	S	S	S	S	S	S

S- Strong; M-Medium; L- Low

CLO Number	CLO Statement	Knowledge Level
CLO1.	Know basic concepts relating integration, differentiation and Fourier series	K1
CLO2.	Understand several techniques of differentiation and integration of real valued functions	K2
CLO3.	Learn methods of formation and solving differential equations of dimensions one and higher	K3
CLO4.	Impart the application of periodic functions through Fourier series	K4

MATHEMATICS FOR SCIENCES II - TH24A25 – 103 HRS

UNIT I **21Hrs**

Integration – Integration by parts – Multiple integrals – Evaluation of the double integral – Changing the order of integration –Double integral in polar co-ordinates.

UNIT II 21Hrs

Integration: Application of double integrals in evaluating area between curves – Evaluation of triple integrals – Jacobian of two and three variables– Beta and Gamma functions – Relation – Evaluation of double and triple integrals using Beta and Gamma Functions.

UNIT III 20 Hrs

Differential equation of the form $(aD^2 + bD + C)y = e^{ax}\varphi(x)$, where a,b,c are constants, $\varphi(x) = \sin mx$ or $\cos mx$ or x^m–Solution of homogeneous linear differential equations of the form $(ax^2D^2 + bxD + c)\ y = X$, where X is a function of x–Equations reducible to the linear homogenous equation.

UNIT IV 20 Hrs

Formation of partial differential equations by eliminating arbitrary constants and arbitrary functions – Solutions of standard types of first order equations: $f(p,q) = 0$, $f(x,p,q)=0$, $f(y,p,q)=0$, $f(z,p,q)=0$, $f_1(x,p) = f_2(y,q)$, $z = px+qy+f(p,q)$ – Lagrange method of solving linear partial differential equation $P_p+Q_q = R$– Charpit's Method – Simple problems.

UNIT V 21 Hrs

Fourier series: Definition – Finding Fourier coefficients for a given periodic function with period 2π. Odd and Even functions – Half range series – Change of intervals.

Text Book

S. No	Author	Title of the book	Publishers	Year and Edition
1.	S. Narayanan and T.K.ManicavachagomPillay	Calculus Vol II & III	S.Viswanathan (Printers and Publishers) Pvt.Ltd.	2000 and 1st edn

Reference Books

S. No	Author	Title of the book	Publishers	Year and Edition
1	Dr. M. D. Raisinghania	Ordinary and Partial differential Equations	S Chand and Company Ltd.	2013 and 19th edn
2	Richard C. Diprima William E.Boyce	Elementary Differential equations and Boundary value problems	Wiley India private Ltd.	2013 and 9th edn
3	A. K. Sharma	Multiple Integrals	Discovery Publishing House.	2005 and 1st edn

UNIT I & II : Vol II Chapter 1– Section – 12.0.
Chapter 5 –Sections – 2.1 to 4.0, 5.1 to 5.4 & 6.1 to 6.3.
Chapter 6 –Sections – 1.1 to 2.4.
Chapter 7 –Sections – 2.1 to 2.3,3,4,5,6.
UNIT III : Vol III Chapter 2 –Sections – 1.0 to 4, 8.0 to 8.3, 9.0.
UNIT IV : Chapter 4 –Sections – 1.0 to 7.0.
UNIT V : Chapter 6 –Sections – 1.0 to 6.0.

NOTE:
Question paper setters to confine to the above text books only.

E-Content
Evaluation of double integrals

https://www.youtube.com/watch?v=2snhn2lK7-Y

Jacobian of two and three variables

https://www.youtube.com/watch?v=Bw5yEqwMjQU

Equation reducible to homogeneous equation

https://www.youtube.com/watch?v=pM5AdA6zipA

Eliminating arbitrary constants and arbitrary functions

https://www.youtube.com/watch?v=vw6fzRd-kvs

Odd and Even functions

https://www.youtube.com/watch?v=JyUJt8LLkU4

Course Designers:

1.Dr.(Mrs).B.TamilSelvi,

2.Dr.(Mrs). D.Sasikala,