

**SRI MEENAKSHI GOVERNMENT ARTS COLLEGE FOR WOMEN  
(AUTONOMOUS),  
MADURAI – 625 002**



**DEPARTMENT OF ZOOLOGY**

**B.Sc., Zoology**

**Outcome Based Syllabi**

**For those who are admitted in the academic year 2021- 2022**

**SRI MEENAKSHI GOVERNMENT COLLEGE FOR WOMEN (AUTONOMOUS),  
MADURAI – 625002**

**Syllabi for B.Sc., Zoology**

(For candidates admitted in the academic year 2021- 2022)

SEM	PAPER CODE	TITLE OF THE PAPER	HRS.	CREDITS	EXAM HRS.	IA	EA	TOTAL
I	1A1	Language -I	6	3	3	25	75	100
	2A1	English Language - I	6	3	3	25	75	100
	Z11	Core I – Invertebrata	4	4	3	25	75	100
	PZ1	Core 2 - Practical 1 - Invertebrata, Chordata and Developmental Biology	4	-	-	-	-	-
	Z21	Core 3 - Developmental Biology	2	-	-	-	-	-
	AS1	First Allied course 1 - Sericulture I	4	3	3	25	75	100
	SPA	First Allied course 2 - Practical - Sericulture	3	-	-	-	-	-
	AV1	Value Education	1	-	-	-	-	-
II	1A2	Language -II	6	3	3	25	75	100
	2A2	English Language - II	6	3	3	25	75	100
	PZ1	Core 2 - Practical 1 - Invertebrata, Chordata and Developmental Biology	4	4	3	40	60	100
	Z21	Core 3 - Developmental Biology	2	4	3	25	75	100
	Z22	Core 4 - Chordata	4	4	3	25	75	100
	SPA	First Allied course 2 - Practical - Sericulture	3	3	3	40	60	100
	AS2	First Allied course 3 - Sericulture II	4	4	3	25	75	100
	AV1	Value Education	1	2	3	25	75	100
III	1A3	Language - III	6	3	3	25	75	100
	2A3	English Language - III	6	3	3	25	75	100
	Z31	Core 5 - Genetics	4	4	3	25	75	100
	Z32	Core 6- Biodiversity and Evolution	4	4	3	25	75	100
	AC1	Second Allied course 1	4	3	3	25	75	100
	CPA	Second Allied course 2 - Practical - Chemistry II	3	-	-	-	-	-
	SZ31	Skill based Elective1 Bioinstrumentation and Biotechniques	2	2	3	25	75	100
	SZ42	Skill based Elective 2 - Vermiculture and Vermicomposting	1	-	-	-	-	-
	1A4	Language – IV	6	3	3	25	75	100
	2A4	English language – IV	6	3	3	25	75	100

IV	Z41	Core 7-Biochemistry	4	4	3	25	75	100
	Z42	Core 8 – Animal Physiology	4	4	3	25	75	100
	CPA	Second Allied course 2 - Practical - Chemistry II	3	3	3	40	60	100
	AC2	Second Allied course 3	4	4	3	25	75	100
	SZ42	Skill based Elective 2 - Vermiculture and Vermicomposting	1	2	3	25	75	100
	SZ43	Skill based Elective 3 - Medical biology	2	2	3	25	75	100

V	Z51	Core 9- Immunology	6	5	3	25	75	100
	Z52	Core10- Cell and Molecular Biology	5	5	3	25	75	100
	PZ2	Core 11- Practical 2 (core 5,6,7&8)	4	2	3	40	60	100
	EZ51	Elective 1 - Human Nutrition	5	5	3	25	75	100
	EZ52	Elective 2 - Economic Zoology	5	5	3	25	75	100
		Skill based Elective 4 - General Knowledge	2	2	3	25	75	100
	SZ65	Skill based Elective 5 - Bioinformatics	1	-	-	-	-	-
NMZ1	Non Major elective 1 - Human Reproductive Biology	2	2	3	25	75	100	
VI	PZ3	Core 11 - Practical 3 (core 9,10, 13 & 14)	4	2	3	40	60	100
	Z61	Core 12- Biophysics and Biostatistics	4	4	3	25	75	100
	Z62	Core 13 - General Microbiology	5	5	3	25	75	100
	Z63	Core 14- Biotechnology	5	5	3	25	75	100
	EZ63	Elective 3 - Fishery Biology	5	5	3	25	75	100
	SZ65	Skill based Elective 5 - Bioinformatics	1	2	3	25	75	100
	SZ66	Skill based Elective 6 – Entrepreneurial Development	2	2	3	25	75	100
	NMZ2	Non Major elective 2 – Women and child care	2	2	3	25	75	100
ENS6	Environmental Studies	2	2	3	25	75	100	
Part V	Extension Activity/ NSS/NCC/Sports		1					
		<b>Total</b>		<b>140</b>				

### ALLIED ZOOLOGY FOR CHEMISTRY MAJOR STUDENTS

SEM	PAPER CODE	TITLE OF THE PAPER	HRS.	CREDITS	EXAM HOURS	IN	EA	TOTAL
III	AZ1	Allied Zoology - Paper 1 – General Zoology I	4	3	3	25	75	100
III & IV	ZPA	Allied Zoology - Paper II Practical	3	3	3	40	60	100
IV	AZ2	Allied Zoology - Paper III – General Zoology II	4	4	3	25	75	100

### ELECTIVE COURSES FOR B.SC., ZOOLOGY STUDENTS

1. Human Nutrition (EZ51) / Apiculture (EZ51)
2. Economic Zoology (EZ52)/ Clinical Biology (EZ52)
3. Fishery Biology (EZ53)/ Biology and Human welfare (EZ53)

### SKILL BASED ELECTIVE COURSE FOR B.SC., ZOOLOGY STUDENTS

1. Bioinstrumentation and Biotechniques
2. Vermiculture and Vermicomposting
3. Medical Biology
4. General Knowledge
5. Bioinformatics
6. Entrepreneurial Development

### NON- MAJOR ELECTIVE COURSES FOR OTHER MAJOR STUDENTS

1. Human Reproductive Biology
2. Women and Child care

Programme : B.Sc., ZOOLOGY  
 Semester : I  
 Subject code: Z11

Part III: Core I  
 Hours: 4 P/W 60/S  
 Credits: 4

**TITLE OF THE PAPER: INVERTEBRATA**

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDOES/TUTORIAL	ICT	
	4	3	-	-	1	
<b>PREAMBLE:</b>						
The course is designed to gain knowledge and understanding of classification of Animal Kingdom and various physiological systems of Invertebrates						
<b>COURSE OUTCOME</b>					<b>Unit</b>	<b>Hrs P/S</b>
At the end of the Semester, the Students will be able to						
<b>UNIT 1 - CO1: classify animal kingdom</b> Describe life cycle of <i>Plasmodium vivax</i> and canal system of Porifera					<b>1</b>	<b>8</b>
<b>UNIT 2 - CO2: list out general characters of phylum Helminthes and Annelida</b> Analyse the parasitic adaptations of helminthes and adaptive radiation in Annelida					<b>2</b>	<b>15</b>
<b>UNIT 3 - CO3: describe the excretory , reproductive system and life cycle of <i>Pienaeus monodon</i></b> compare and contrast the mouth parts of insects					<b>3</b>	<b>15</b>
<b>UNIT 4 - CO4listout the general characters of phylum Mollusca</b> Write an essay on physiology of <i>Pila globosa</i> and torsion in Gastropoda					<b>4</b>	<b>12</b>
<b>UNIT 5 CO5: describe the water vascular system of starfish and larval forms of Echinodermata</b>					<b>5</b>	<b>10</b>
<b>SYLLABUS</b>						
<b>UNIT I:</b> Classification of animal kingdom - binomial nomenclature, general characters of phylum Protozoa - classification up to class level with examples. Type study - <i>Plasmodium vivax</i> - life cycle. Porifera - canal system in sponges. General characters of phylum Colenterata.						
<b>UNIT II:</b> General characters of phylum Helminthes - classification up to class level with examples - type study - <i>Fasciola hepatica</i> - life cycle. Parasitic adaptations in Helminthes. General characters of phylum Annelida - classification up to class level with examples - type study - Neris - external characters, digestive system, excretory system and reproductive system. Adaptive radiation in Annelida.						
<b>UNIT III:</b>						

General characters of phylum Arthropoda - classification up to class level with examples - type study - *Piенаeus monodon*- external characters, appendages, excretory system, reproductive system and life cycle. Mouth parts of insects – Cockroach, Mosquito, Butterfly and House fly.

**UNIT IV:**

General characters of phylum Mollusca - classification up to class level with examples. Type study - *Pila globosa*- external characters, digestive system, respiratory system and nervous system. Torsion in Gastropoda.

**UNIT V:**

General characters of phylum Echinodermata - classification up to class level with examples. Type study - Star fish - external characters and water vascular system. Larval forms of Echinoderms.

**TEXTBOOK:**

1. Ekambaranatha Iyyar and Ananathakrishnan TN. A Manual of Zoology. Vol I Invertebrata, Part I and II. S. Vishwanathan Pub. and Pvt. Ltd., 1992

**REFERENCE BOOKS:**

1. Jordan EL and Verma PS. Invertebrate zoology. S. Chand and Company Ltd., 2012
2. Kotpal RL, Agarwal SK and Khetarpal RP. Modern Text book of Zoology - Invertebrates. Rastogi Pub., 1985

Course Designer: Dr. M. Kalaiarasi

**Course Contents and Lecture Schedule**

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
<b>UNIT 1</b>			
1.1	Classification of animal kingdom – binomial nomenclature	1	Lecture
1.2	general characters of phylum Protozoa - classification up to class level with examples	2	Lecture
1.3	Type study - <i>Plasmodium vivax</i> - life cycle	2	ICT
1.4	Porifera - canal system in sponges	2	ICT
1.5	General characters of phylum Colenterata	1	Lecture
<b>UNIT 11</b>			
2.1	General characters of phylum Helminthes - classification up to class level with examples	2	Discussion
2.2	type study - <i>Fasciola hepatica</i> - life cycle. Parasitic adaptations in Helminthes.	5	Lecture 3 ICT 2

2.3	General characters of phylum Annelida - classification up to class level with examples - type study - Neris - external characters, digestive system, excretory system and reproductive system	6	ICT 3 Lecture 3
2.4	Adaptive radiation in Annelida	2	Lecture
<b>UNIT III</b>			
3.1	General characters of phylum Arthropoda - classification up to class level with examples	4	ICT 2 Lecture 2
3.2	type study - <i>Pleurochaeta</i> - external characters, appendages, excretory system, reproductive system and life cycle	7	ICT 4 Lecture 3
3.3	Mouth parts of insects – Cockroach, Mosquito, Butterfly and House fly	4	ICT 3 Lecture 1
<b>UNIT IV</b>			
4.1	General characters of phylum Mollusca - classification up to class level with examples	4	Lecture 2 ICT 2
4.2	Type study – <i>Pila globosa</i> - external characters, digestive system, respiratory system and nervous system.	5	ICT 3 Lecture 2
4.3	Torsion in Gastropoda	3	ICT 1 Lecture 2
<b>UNIT V</b>			
5.1	General characters of phylum Echinodermata - classification up to class level with examples	3	Assignment
5.2	system Type study - Star fish - external characters and water vascular	4	
5.3	Larval forms of Echinoderms	3	Visual aids

Course Outcomes (Cos)	Programme Outcomes (Pos)					Programme Specific Outcomes (PSOs)							Mean scores of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	
CO1	4	4	3	4	3	3	4	3	4	3	3	4	3.50
CO2	4	3	3	3	5	4	4	4	3	4	3	3	3.58
CO3	3	3	3	4	3	3	3	4	3	3	4	4	3.33
CO4	3	4	4	3	4	3	4	5	3	3	4	3	3.58
CO5	4	3	3	4	3	3	3	4	4	3	4	3	3.41
<b>Mean Overall Score</b>													<b>3.48</b>

**Result: The Score for this Course is 3.45 (High Relationship)**

<b>Mapping</b>	<b>1-20%</b>	<b>21-40%</b>	<b>41-60%</b>	<b>61-80%</b>	<b>81-100%</b>
<b>Scale</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Relation</b>	<b>0.0-1.0</b>	<b>1.1-2.0</b>	<b>2.1-3.0</b>	<b>3.1-4.0</b>	<b>4.1-5.0</b>

Quality	Very Poor	Poor	Moderate	High	Very High
Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos\& PSOs}}$			Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$		

BLOOM'S TAXANOMY	INTERNAL	EXTERNAL
KNOWLEDGE	50%	50%
UNDERSTANDING	30%	30%
APPLY	20%	20%

Programme : B.Sc Zoology

Semester : I&II

Sub. Code : Z21

Part III: Core

Hours : 2P/W 30Hrs P/S

Credits: 4

**TITLE OF THE PAPER: DEVELOPMENTAL BIOLOGY**

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDEOS/TUTORIAL	ICT
	2	1	-	-	1

**PREAMBLE:**

The course provides knowledge to understand the events of fertilization and organ formation and to gain knowledge on various concepts and ideas in this discipline

COURSE OUTCOME	Unit	Hrs P/S
At the end of the Semester, the Students will be able to		
UNIT 1- CO1: Enhance knowledge and appreciation of developmental biology	1	8
UNIT 2- CO2: Impact knowledge regarding basic concepts of growth and differentiation	2	8
UNIT 3 -CO3: Develop detailed understanding of essential events of developmental biology through proper explanation	3	6
UNIT 4 -CO4: Provide adequate explanation to the students with respect to late embryonic developmental events	4	4
UNIT 5- CO5: Give proper information to the learners regarding post embryonic development especially metamorphosis and regeneration	5	4

**SYLLABUS**

**UNIT I:**

Gametogenesis, Spermatogenesis, structure of sperm of frog, Oogenesis, Structure of egg of frog and chick.

**UNIT II:**

Fertilization, Physic-chemical, cytological and biochemical aspects of fertilization, Fate map of frog and chick, cleavages in frog and chick, Gastrulation in frog and chick



**UNIT III:****Organogenesis, Derivatives of germ layers, Development of brain in Chick, Development of heart****UNIT IV:****Development of foetal membranes in chick, Placenta in mammals, Types of placenta, Functions of placenta****UNIT V:****Organizer concepts, Organizer types, Amphibian metamorphosis, Hormonal control of metamorphosis****Regeneration types, Neoteny****TEXT BOOKS:**

1. Verma PS and Agarwal VK. Chordate Embryology. 9th Edn., S. Chand and Company, Ltd., New Delhi, 1989

**REFERENCES:**

1. Ballinsky BI. An Introduction to Embryology. 5th Edn., Saunders College Pub., Philadelphia, 1981
2. Berrill NJ. Developmental Biology. 2nd Edn., Tata McGraw Hill Pub. Ltd., New Delhi, 1964
3. Pattern BM and Carlson BM. Foundations of Embryology. 3rd Edn., Tata McGraw Hill Pub. Ltd., New Delhi, 1964

**Course designer: Dr.S.Mala****Course Contents and Lecture Schedule**

<b>UNITS</b>	<b>TOPIC</b>	<b>LECTURE HOURS</b>	<b>MODE OF TEACHING</b>
<b>UNIT 1</b>			
<b>1.1</b>	<b>Gametogenesis</b>	<b>2</b>	<b>Lecture-2</b>
<b>1.2</b>	<b>Spermatogenesis</b>	<b>2</b>	<b>ICT-1, lecture -1</b>
<b>1.3</b>	<b>Structure of sperm of frog.</b>	<b>1</b>	<b>Charts with lecture-1</b>
<b>1.4</b>	<b>Oogenesis</b>	<b>2</b>	<b>ICT-1, lecture-1</b>
<b>1.5</b>	<b>Structure of egg of frog and chick</b>	<b>1</b>	<b>Models with lecture-1</b>
<b>UNIT 11</b>			
<b>2.1</b>	<b>Fertilization</b>	<b>2</b>	<b>ICT-1, lecture-1</b>
<b>2.2</b>	<b>Physic-chemical, cytological and biochemical aspects of fertilization.</b>	<b>1</b>	<b>Lecture-1</b>
<b>2.3</b>	<b>Fate map of frog and chick</b>	<b>1</b>	<b>Charts with lecture-1</b>
<b>2.4</b>	<b>cleavages in frog and chick</b>	<b>2</b>	<b>ICT -1, Lecture-1</b>
<b>2.5</b>	<b>Gastrulation in frog and chick</b>	<b>2</b>	<b>ICT-1, Lecture-1</b>

<b>UNIT III</b>			
<b>3.1</b>	<b>Organogenesis</b>	<b>1</b>	<b>Lecture-1</b>
<b>3.2</b>	<b>Derivatives of germ layers</b>	<b>1</b>	<b>Lecture-1</b>
<b>3.3</b>	<b>Development of brain in Chick</b>	<b>2</b>	<b>ICT-1,lecture-1</b>
<b>3.4</b>	<b>Development of heart in chick.</b>	<b>2</b>	<b>ICT-1,lecture-1</b>
<b>UNIT IV</b>			
<b>4.1</b>	<b>Development of foetal membranes in chick</b>	<b>1</b>	<b>Lecture with Visual aids-1</b>
<b>4.2</b>	<b>Placenta in mammals</b>	<b>1</b>	<b>Models with Lecture-1</b>
<b>4.3</b>	<b>Types of placenta</b>	<b>1</b>	<b>ICT-1</b>
<b>4.4</b>	<b>Functions of placenta</b>	<b>1</b>	<b>Charts with explanation-1</b>
<b>UNIT V</b>			
<b>5.1</b>	<b>Organizer concepts</b>	<b>1</b>	<b>Lecture-1</b>
<b>5.2</b>	<b>Organizer types.</b>	<b>-</b>	<b>Assignment submission</b>
<b>5.3</b>	<b>Amphibian metamorphosis</b>	<b>1</b>	<b>ICT-1</b>
<b>5.4</b>	<b>Hormonal control of metamorphosis</b>	<b>-</b>	<b>Charts submission</b>
<b>5.5</b>	<b>Regeneration types</b>	<b>1</b>	<b>Lecture -1</b>
<b>5.6</b>	<b>Neoteny.</b>	<b>1</b>	<b>ICT and Lecture</b>

<b>Course Outcomes (Cos)</b>	<b>Programme Outcomes (POs)</b>					<b>Programme Specific Outcomes (PSOs)</b>							<b>Mean scores of Cos</b>
	<b>PO 1</b>	<b>PO2</b>	<b>PO 3</b>	<b>PO4</b>	<b>PO5</b>	<b>PSO 1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>	<b>PSO 6</b>	<b>PSO 7</b>	
<b>CO1</b>	<b>3</b>	<b>4</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>4</b>	<b>4</b>	<b>3</b>	<b>4</b>	<b>4</b>	<b>3</b>	<b>3</b>	<b>3.41</b>
<b>CO2</b>	<b>4</b>	<b>3</b>	<b>3</b>	<b>5</b>	<b>3</b>	<b>5</b>	<b>3</b>	<b>4</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3.41</b>
<b>CO3</b>	<b>3</b>	<b>3</b>	<b>5</b>	<b>4</b>	<b>3</b>	<b>4</b>	<b>4</b>	<b>3</b>	<b>3</b>	<b>4</b>	<b>4</b>	<b>3</b>	<b>3.58</b>
<b>CO4</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>4</b>	<b>3</b>	<b>4</b>	<b>3.16</b>
<b>CO5</b>	<b>3</b>	<b>4</b>	<b>4</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>4</b>	<b>3</b>	<b>3</b>	<b>3.5</b>
	<b>Mean Overall Score</b>												<b>3.41</b>

**Result: The Score for this Course is 3.41 (High Relationship)**

<b>Mapping</b>	<b>1-20%</b>	<b>21-40%</b>	<b>41-60%</b>	<b>61-80%</b>	<b>81-100%</b>
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Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High
Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos \& PSOs}}$			Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$		

BLOOM'S TAXANOMY	INTERNAL	EXTERNAL
KNOWLEDGE	50%	50%
UNDERSTANDING	30%	30%
APPLY	20%	20%

Programme : B.Sc  
Semester : I  
Sub. Code : PZ1

CORE 2: PRACTICAL  
Hours: 4P/W 60 Hrs P/S  
Credits: 4

**TITLE OF THE PAPER: CORE 2: PRACTICAL – INVERTEBRATA, CHORDATA  
AND DEVELOPMENTAL BIOLOGY**

Pedagogy	Hours	Demonstration	Peer Teaching	TUTORIAL/ICT	GD/VIDOES	
	4	2	-	2	-	
<b>PREAMBLE:</b>						
This course will develop practical skills of the students in identifying the animal species and to show how the form, function and behavior of animals become adapted to the environment.						
<b>COURSE OUTCOME</b>					Unit	Hrs P/S
At the end of the Semester, the Students will be able to						
UNIT 1 - CO1: identify and locate the given organ system of an invertebrate by virtual or visual aids,					1	12
UNIT 2 - CO2: develop the skills of mount the body parts and to draw and comment on the given invertebrate specimen/slide/chart					2	14
UNIT 3- CO3: identify and locate the given organ system of an chordate by virtual or visual aids,					3	12
UNIT 4 - CO4 enhance their skill towards mounting the body parts, drawing and writing comment on the given chordate specimen/slide/chart					4	14
UNIT 5 - CO5: identify, draw and comment on the given embryological specimen/slide/chart					5	8

## **SYLLABUS**

### **Invertebrata**

**Dissection:** Virtual dissection: Cockroach-Nervous system and Digestive system

Earth worm- Nervous system (or by model/chart/CD students have to draw diagram and write a detailed account about the system)

**Mounting:** Earth worm - body setae / pineal setae

Prawn appendages

Mouth parts of house fly, mosquito and cockroach

**Spotters: (museum specimen, slides, models and charts)**

Protozoa - Plasmodium, Paramecium

Coelenterata - Obelia colony, Medusa

Helminthes - Ascaris- male & female

Annelida - Nereis, Heteronereis, Arenicola, Cheatopterus

Arthropoda - Prawn entire, Nauplius, Mysis and Zoea larva

Mollusca - Fresh water Mussel, Chiton, Sepia

Echinodermata - Star fish - Oral and aboral views, Bipinnaria and Ophiopluteus larva

### **Chordata**

**Dissection:** Virtual dissection of frog - Arterial system, venous system and

Urinogenital system (or by model/chart/CD students have to draw diagram and write a detailed account about the system)

**Mounting:** Placoid scales / Cycloid of fish

Brain of frog (model/chart/CD). Students have to draw the dorsal and ventral view of brain and write a detailed account about this.

**Spotters: museum specimen, slides, models and charts**

Prochordata - Amphioxus, Balanoglossus, Ascidian

Pisces - Narcine, Anabas, Echeneis, Eel, Clarius, Hippocampus

Amphibia - Rhacophorus, Salamander, Alytes

Reptilia - Cobra, Viper, Chameleon, Draco

Aves - Ostrich, Pelican

Mammalia - Ant eater, Bat

**Developmental Biology****Spotters: museum specimen, slides, models and charts**

Frog - Blastula, Gastrula, Yolk plug  
 Chick -Blastoderm- 24 hrs and 48 hrs  
 Placenta of pig and sheep

Field visit

**Reference Books:**

Poddar T, Mokhopadhyay B and Das SK. An advanced Laboratory Manual of Zoology.

Macmillan Pub., 2010

Verma PS. A Manual of Practical Zoology. S. Chand and Company Ltd., 2007

**Course designer: Dr.V.Kabila**

**Course contents and lecture schedule**

UNITS	TOPIC	PRACTICAL HRS.	MODE OF TEACHING
<b>UNIT I</b>			
1.1	Virtual dissection: Cockroach-Nervous system and Digestive system; Earth worm- Nervous system (or by model/chart/CD students have to draw diagram and write a detailed account about the system)	12	Demo-6 ICT/ Tutorial-6
<b>UNIT II</b>			
2.1	<b>Mounting:</b> Earth worm - body setae / pineal setae ,Prawn appendages, Mouth parts of house fly, mosquito and cockroach	6	Demo-3 Tutorial-3
2.2	Spotters: Protozoa - Plasmodium, Paramecium ;Coelenterata-Obelia colony, Medusa ; Helminthes - Ascaris- male & femal;,Annelida -Nereis, Heteronereis, Arenicola, Cheatopterus; Arthropoda- Prawn entire, Nauplius, Mysis and Zoea larva; Mollusca - Fresh water Mussel, Chiton, Sepia; Echinodermata - Star fish - Oral and aboral views, Bipinnaria and Ophiopluteus larva	8	Demo-2 Tutorial-6
<b>UNIT II</b>			
3.1	Virtual dissection of frog- Arterial system, venous system and Urinogenital system (or by model/chart/CD students have to draw diagram and write a detailed account about the system)	12	Demo-6 ICT/ T-6
<b>UNIT IV</b>			
4.1	<b>Mounting:</b> Placoid scales/Cycloid of fish, Brain of frog (model/chart/CD). Students have to draw the dorsal and ventral view of brain and write a detailed account about this	6	Demo-3 Tutorial-3

4.2	<b>Spotters:</b> Prochordata- Amphioxus, Balanoglossus, Ascidian; Pisces -Narcine, Anabas, Echeneis, Eel, Clarius, Hippocampus; Amphibia-Rhacophorus, Salamander, Alytes ;Reptilia- Cobra, Viper, Chameleon, Draco; Aves -Ostrich, Pelican;Mammalia - Ant eater, Bat	8	Demo-2 Tutrorial-6
<b>UNIT V</b>			
5.1	Developmental Biology:Spotters: Frog - Blastula, Gastrula, Yolk plug; Chick -Blastoderm- 24 hrs and 48 hrs; Placenta of pig and sheep	4	Tutorial—4
5.2	Field visit to zoo/museum/ marine habitat (optional)		

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							Mean scores of Cos
	PO1	PO2	PO3	PO4	PO5	PS O1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	
CO1	3.5	3.5	3.0	3.7	2.0	3.8	3.8	3.0	3.4	3.0	3.0	3.7	3.28
CO2	3.6	3.5	3.1	3.6	2.5	3.7	3.9	3.1	3.6	3.1	3.0	3.6	3.35
CO3	3.5	3.5	3.0	3.6	2.0	3.8	3.7	3.0	3.3	3.1	3.1	3.8	3.28
CO4	3.6	3.2	3.0	3.6	2.6	3.6	3.7	3.1	3.2	3.0	3.0	3.7	3.27
CO5	3.5	3.6	3.1	3.4	2.2	3.6	3.8	3.5	3.5	3.2	3.4	3.6	3.36
<b>Mean Overall Score</b>												<b>3.30</b>	

**Result: The Score for this Course is 3.30 (High Relationship)**

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High
Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos \& PSOs}}$			Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$		

BLOOM'S TAXANOMY	INTERNAL	EXTERNAL
KNOWLEDGE	50%	50%
UNDERSTANDING	30%	30%
APPLY	20%	20%

**Programme : UG**  
**Semester : II**  
**Sub.Code : Z22**

**Part III: Core 4**  
**Hours: 4 P/W 60 HrP/S**  
**Credits: 4**

**TITLE OF THE PAPER: CORE 4: CHORDATA**

<b>Pedagogy</b>	<b>Hours</b>	<b>Lecture</b>	<b>Peer teaching</b>	<b>GD/VIDEOS/TUTORIAL</b>	<b>ICT</b>
	<b>4</b>	<b>2</b>		<b>-</b>	<b>2</b>

**PREAMBLE:**

**The course will provide basic knowledge about general characters and classification of chordates and to understand the structure and functions of various organ systems of Amphioxus, Scoliodon, Frog, Snakes and Rabbit.**

<b>COURSE OUTCOME</b>	<b>Unit</b>	<b>Hrs P/S</b>
<b>At the end of the Semester, the Students will be able to</b>		
<b>UNIT1 - CO1 : Impart basic knowledge about the general characters and classification of chordates</b>	<b>1</b>	<b>10</b>
<b>UNIT 2 - CO2: Demonstrate a broad understanding of animal diversity in pisces through classification and organ systems</b>	<b>2</b>	<b>10</b>
<b>UNIT 3 - CO3: Recognise critical thinking to interpret the unique characters and classification of Amphibians and Reptiles</b>	<b>3</b>	<b>15</b>

<b>UNIT 4 - CO4 : Provide and gain knowledge of scientific classifications and information and evolutionary significance in aves</b>	<b>4</b>	<b>10</b>
<b>UNIT 5 - CO5: Understand analytical thinking about classification and organ systems in mammals</b>	<b>5</b>	<b>15</b>

## **SYLLABUS**

### **UNIT I:**

**General characters of Chordata and its outline classification. Prochordata - general characters and its outline classification up to class level with example - type study - Amphioxus -feeding mechanism and excretory system. Affinities of Balanoglossus, Retrogressive metamorphism in Ascidian.**

### **UNIT II:**

**Vertebrata - Pisces - general characters and its classification up to class level with example - type study - Scoliodon - circulatory system, urinogenital system and lateral line system. Migration in Fishes. Affinities of Petromyzon.**

### **UNIT III:**

**Amphibia - general characters and its classification up to class level with example - type study - Frog - digestive and respiratory system. Parental care in Amphibia. Reptilia - general characters and its classification up to class level with example. Identification of poisonous and non-poisonous snakes of south India. Poison apparatus, biting mechanism, First aid and treatment.**

### **UNIT IV:**

**Aves –General characters and its classification up to class level with example. Type study - Pigeon – Respiratory System, Circulatory system, structure of Eye. Flight adaptation in birds.**

### **UNIT V:**

**Mammalia - general characters and its classification up to class level with example. Type study - Rabbit - external morphology and urinogenital system. Dentition and Adaptive radiation in Mammals.**

**Textbook:**



1. Ekambaranatha Ayyar and Ananathakrishnan TN. A Manual of Zoology. Vol II Chordata, Vishwanathan and Company., 1992

**Reference Books:**

1. Dhami DS and Dhami JK. Chordate Zoology. R.Chand and Company, 1978
2. Jordon EL and Verma PS. Chordate Zoology, 14<sup>th</sup>Edn., S. Chand and Company, 2013
3. Thangamani T and Arumugam N. A Text book of Chordates. Saras Pub., 1992
2. ThangamaniA,Prasannakumar S, Narayanan LM and Arumugam N. A Text Book of Chordates. 6<sup>th</sup>Edn.,Saras Pub., 2014
4. Thiyagarajan Saba. Zoology thunaipadanool Vol. I & II. Tee Jay Pub., 1998

Vajrapoorani and Sathyaprema. MudhalMuthukuthThandudaiyavai. Tamil Nadu Text Book Corporation., 1973

Course Designer – Dr. C.Rani Vijaya

**COURSE CONTENT AND LECTURE SCHEDULE**

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
<b>UNIT 1</b>			
1.1	General characters of Chordata	2	Lecture -1, video demonstration-1
1.2	Outline classification	2	Lecture -2
1.3	Prochordata - general characters and its outline classification up to class level with example	1	Lecture -1
1.4	Type study Amphioxus Feeding mechanism and excretory system..	3	Lecture -1, ICT-2
1.5	Affinities of Balanoglossus, Retrogressive Metamorphism in Ascidian	2	Lecture -1, ICT - 1
<b>UNIT 2</b>			
2.1	Vertebrata - Pisces - general characters and its classification up to class level with example	3	Lecture -2 video demonstration-1
2.2	Type study - Scoliodon - circulatory	2	Lecture-2

	system		
2.3	Urinogenital system and lateral line system.	2	Lecture-1, ICT – 1
2.4	Migration in Fishes. Affinities of Petromyzon.	3	Lecture -2 video demonstration-1
<b>UNIT 3</b>			
3.1	Amphibia - general characters and its classification up to class level with example	3	Lecture-2, ICT -1
3.2	Type study - Frog - digestive and respiratory system. Parental care in Amphibia	4	Lecture-2, ICT -2
3.3	Reptilia - general characters and its classification up to class level with example.	3	Lecture-2- ICT-1
3.4	Identification of poisonous and non-poisonous snakes of south India. Poison apparatus, biting mechanism, First aid and treatment.	5	Lecture-3, ICT -2
<b>UNIT 4</b>			
4.1	Mammalia - general characters and its classification up to class level with example	2	Lecture -1, video demonstration-1
4.2	Type study - Pigeon -Introduction	2	Lecture -2
4.3	Circulatory system structure of Eye	3	Lecture -2, ICT – 1
4.4	Flight adaptation in birds	3	Lecture-2, ICT -1
<b>UNIT 5</b>			
5.1	Mammalia - general characters	2	Lecture -1, video demonstration-1
5.2	Classification up to class level with example	2	Lecture-1, ICT -1
5.3	Type study - Rabbit - external morphology	3	LECTURE-2, ICT -1
5.4	Urinogenital system	2	Lecture-1, ICT -1
5.5	Dentition	3	Lecture -2, video demonstration-1
5.6	Adaptive radiation in Mammals.	3	Lecture-2, ICT - 1

Course Outcomes (Cos)	Programme outcomes (POs)					Programme specific outcomes (PSOs)							Mean Scores Of Cos
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	
CO 1	4	3	4	4	4	4	3	3	4	4	3	4	3.6
CO 2	4	4	4	4	4	4	4	3	4	4	4	4	3.9
CO 3	3	4	3	4	4	3	4	4	4	4	4	4	3.7
CO 4	4	4	4	4	3	4	4	3	4	4	4	4	3.8
CO 5	4	4	3	4	4	4	4	3	4	3	4	4	3.7
<b>Mean overall score</b>												<b>3.7</b>	

Result: The score for this course is **3.7** (High relationship)

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High
Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos \& PSOs}}$			Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$		

BLOOM'S TAXANOMY	INTERNAL	EXTERNAL
KNOWLEDGE	50%	50%
UNDERSTANDING	30%	30%
APPLY	20%	20%

**Programme: B. Sc**  
**Semester :III**  
**Sub. Code :Z31**

**Part III: Core**  
**Hours: 4 P/W 60 Hrs P/S**  
**Credits: 4**

**TITLE OF THE PAPER: GENETICS**

Pedagogy	Hours	Lecture	Peer Teaching	GD/Videos/Tutorial	ICT	
	4	2	-	1	1	
<b>PREAMBLE:</b> This course helps to acquire knowledge about basic principles of Genetics and understand the concepts of gene interaction and the functions of chromosome.						
<b>COURSE OUTCOME</b> At the end of the Semester, the Students will be able to					<b>Unit</b>	<b>Hrs P/S</b>
UNIT I- CO1: acquire knowledge on classical genetics					1	10
UNIT II- CO2: understand gene interaction and its outcome					2	10
UNIT III- CO3: analyze the techniques applied in genetics					3	12
UNIT IV- CO4: understand population genetics					4	14
UNIT V- CO5: develop knowledge about human genetics and to assess the					5	14

## **SYLLABUS**

### **UNIT I:**

Introduction - Mendelian principles - monohybrid cross- back cross - test cross - dihybrid cross- Mendel's laws.

### **UNIT II:**

Gene interaction – Non allelic - complementary, supplementary and epistatic interaction. Allelic - complete and incomplete dominance, co-dominance. Multiple allelism- ABO,MN and Bombay Blood grouping.

### **UNIT III:**

Linkage - types of linkage, arrangement of linked genes. Crossing over- mechanism, types, factors affecting linkage and crossing over. Chromosome mapping-construction of chromosome map in Drosophila.

### **UNIT IV:**

Sex determination in man and honey bee; sex-linked genes- haemophilia, colour blindness. Population genetics - gene pool, gene frequency and genotype frequency, genetic equilibrium, Hardy - Weinberg law, Factors affecting Hardy Weinberg Law.

### **UNIT V:**

Human genetics - Inborn errors of metabolism, karyotyping - karyotype and idiogram. Anomalies in sex chromosomes - Klinefelter's, Turner's and Down's syndrome. Anomalies in autosomes- aneuploidy and polyploidy in man - Heredity of twins - types, origin, frequency and occurrence of twins. Genetic counselling – Eugenics, Euthenics and Euphenics.

### **TEXT BOOK:**

Verma VK and Agarwal SK. Genetics. S. Chand and Company, 2000

### **REFERENCE BOOKS:**

1. Gardner EJ, Simmons MJ and Snustad DP. Principles of Genetics. John Wiley and Smith Inc., 2010
2. Russel PJ. Genetics - A Molecular Approach. 3<sup>rd</sup>Edn., Pearson Edn. Inc., 2010
3. StrickbergerMW. Genetics. 3<sup>rd</sup>Edn., PHI Learning Pvt. Ltd ., 2013

Course Designer: Dr. H. Vijayarani

Course contents and Lecture schedule

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
<b>UNIT I</b>			
1.1	Introduction- Mendelian principles - monohybrid cross- back cross - test cross - dihybrid cross	6	Lecture (4 hrs) Tutorial (2 hrs)
1.2	Mendel's laws	4	Lecture
<b>UNIT II</b>			
2.1	Gene interaction – Non allelic - complementary, supplementary and epistatic interaction.	4	Lecture (3hrs) ICT (1 hr)
2.2	Allelic - complete and incomplete dominance, co-dominance	4	Lecture (3 hrs) Video (1 hr)
2.3	Multiple allelism- ABO and MN blood grouping	2	Lecture
<b>UNIT III</b>			
3.1	Linkage - types of linkage, arrangement of linked genes	4	Lecture (3 hrs) Video (1 hr)
3.2	Crossing over- mechanism, types, factors affecting linkage and crossing over	4	Lecture
3.3	Chromosome mapping-construction of chromosome map in Drosophila.	4	Lecture (3hrs) Group Discussion (1 hr)
<b>UNIT 4</b>			
4.1	Sex determination in man and honey bee; sex-linked genes- haemophilia, colour blindness	4	Lecture (3hrs) Video (1 hr)
4.2	Population genetics - gene pool, gene frequency and genotype frequency, genetic equilibrium	5	Lecture (4 hrs) ICT (1 hr)
4.3	Hardy - Weinberg law - Factors affecting Hardy Weinberg Law	5	Lecture (4 hrs) Tutorial (1 hr)
<b>UNIT 5</b>			
5.1	Human genetics - Inborn errors of metabolism. karyotyping- karyotype and idiogram	4	Lecture (3 hrs) ICT (1 hr)
5.2	Anomalies in sex chromosomes - Klinefelter's, Turner's and Down's syndrome. Anomalies in autosomes- aneuploidy and polyploidy in man	4	Lecture
5.3	Heredity of twins - types, origin, frequency and occurrence of twins	3	Lecture
5.4	Genetic counseling - Eugenics, Euthenics and Euphenics.	3	Lecture (2hrs) Group Discussion (1 hr)

Course Outcomes (Cos)	Programme Outcomes (Pos)					Programme Specific Outcomes (PSOs)							Mean scores of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	
CO1	5	2	5	3	2	5	2	2	2	2	5	4	3.25
CO2	5	5	5	3	4	2	5	2	2	5	5	4	3.91
CO3	5	5	4	3	4	3	4	2	2	4	4	4	3.67
CO4	5	5	5	4	4	3	1	5	2	5	4	4	3.91
CO5	5	1	2	3	3	1	2	4	5	3	5	5	3.25
<b>Mean Overall Score</b>												<b>3.60</b>	

**Result: The Score for this Course is 3.60 (High Relationship)**

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High
Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos \& PSOs}}$			Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$		

BLOOM'S TAXANOMY	INTERNAL	EXTERNAL
KNOWLEDGE	50%	50%
UNDERSTANDING	30%	30%
APPLY	20%	20%

Programme : B.Sc  
Semester : III  
Sub. Code : Z32

CORE 6  
Hours : 4P/W 60 Hrs P/S  
Credits : 4

**TITLE OF THE PAPER: BIODIVERSITY AND EVOLUTION**

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDOES/TUTORIAL	ICT	
	4	2	-	1	1	
<b>PREAMBLE</b>						
The course will enable the students to gain knowledge about the diversity of fauna and the principles behind the process of evolution						
<b>COURSE OUTCOME</b>					<b>Unit</b>	<b>Hrs P/S</b>
At the end of the Semester, the Students will be able to						
UNIT 1 - CO1: understand the various components of biodiversity of living organisms and to enrich their knowledge about endangered and extinct species					1	12
UNIT 2- CO2: calculate various biodiversity indices and to enhance their					2	15

knowledge on various conservation strategies		
<b>UNIT 3 - CO3: understand the concepts behind the animal biodiversity policy, its management and organizations involved</b>	<b>3</b>	<b>13</b>
<b>UNIT 4 - CO4: elucidate various theories of evolution and principles involved in them</b>	<b>4</b>	<b>10</b>
<b>UNIT 5 - CO5: appreciate the evolutionary significance of speciation and isolation and to understand the principles behind the process of evolution of man</b>	<b>5</b>	<b>10</b>

## **SYLLABUS**

### **BIODIVERSITY**

**UNIT I:** Biodiversity - definition, types and components, global biodiversity, hotspots. IUCN. Species categories – rare, endangered and threatened species– Red Data Book - causes for extinction.

**UNIT II:** Biodiversity measurement and conservation - Biodiversity indices –  $\alpha$ ,  $\beta$  and  $\gamma$  diversity. *In-situ* conservation - Wild life sanctuaries, National parks. *Ex-situ* conservation – cryopreservation and gene bank. Wild life protection act.

**UNIT III:** Animal Biodiversity policy and management in India - National Biodiversity Register - policy and management implications. Organisations involved in Biodiversity - National and International.

### **EVOLUTION:**

**UNIT IV:** Chemical origin of life - Lamarckism, Darwinism, Devries theory of mutation, Modern synthetic theory of evolution.

**UNIT V:** Speciation, isolating mechanisms - Orthogeneis, Evoloution of man.

- ❖ Field Trip to Wild life and Biodiversity Conservation Centres.

### **TEXTBOOKS:**

1. Arumugam N. Organic Evolution. 10<sup>th</sup> Edn., Saras Pub., 2014



2. Krishnamoorthy K. Introduction to Biodiversity. Oxford and IBH, 2003

**REFERENCE BOOKS:**

1. Bharucha E. The Biodiversity of India. Mapin Pub. Pvt. Ltd.,2000
2. Strickberger MW. Evolution. Jones and Bartlett Pub., 2000
3. Moody PA. Introduction to Evolution. 1<sup>st</sup> Edn., 1978

**Course Designer: Dr. V.Kabila**

**Course contents and lecture schedule**

UNITS	TOPIC	LECTURE HRS.	MODE OF TEACHING
<b>UNIT I</b>			
1.1	Biodiversity - definition, types and components,	4	Lecture-4
1.2	Global biodiversity, hotspots. IUCN. Species categories – rare, endangered and threatened species	5	Lecture-3 ICT-2
1.3	Red Data Book - causes for extinction.	3	Lecture-3
2.1	Biodiversity measurement and conservation - Biodiversity indices – $\alpha$ , $\beta$ and $\gamma$ diversity.	5	Lecture-4 ICT-1
2.2	<i>In-situ</i> conservation - Wild life sanctuaries, National parks. <i>Ex-situ</i> conservation – cryopreservation and gene bank.	5	Lecture-3 GD-1 ICT-1
2.3	Wild life protection act	2	Lecture-2
<b>UNIT- III</b>			
3.1	Animal Biodiversity policy and management in India	5	Lecture-3 GD-1 ICT-2
3.2	National Biodiversity Register - policy and management implications	4	Lecture-3 ICT-2
3.3	Organisations involved in Biodiversity National and International	4	Lecture-3 ICT-1
<b>UNIT IV</b>			
4.1	Chemical origin of life - Lamarckism, Darwinism	5	Lecture-3 ICT-2

4.2	Devries theory of mutation, Modern synthetic theory of evolution.	5	Lecture-2 Tutorial-1 ICT-2
<b>UNIT V</b>			
5.1	Speciation - types - Isolating mechanisms	5	Lecture-2 GD-1 ICT-2
5.2	Orthogenesis, Evolution of man	5	Lecture-3 GD-2

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							Mean scores of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	
CO1	3.8	3.7	3.7	3.5	3.5	3.9	3.0	3.7	3.8	3.1	2.9	3.2	3.48
CO2	3.6	3.7	3.6	3.3	3.7	3.7	3.4	3.4	3.7	3.2	3.8	3.3	3.53
CO3	3.5	3.4	3.4	3.5	3.7	3.5	3.3	3.5	3.8	3.3	3.7	3.2	3.48
CO4	3.3	3.2	3.4	3.2	3.3	3.3	3.2	3.0	3.1	3.2	3.0	3.0	3.18
CO5	3.2	3.6	3.1	3.2	3.2	3.4	3.3	3.3	3.0	3.0	3.0	3.0	3.19
<b>Mean Overall Score</b>													<b>3.37</b>

**Result: The Score for this Course is 3.37 (High Relationship)**

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High
Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos \& PSOs}}$			Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$		

BLOOM'S TAXANOMY	INTERNAL	EXTERNAL
KNOWLEDGE	50%	50%
UNDERSTANDING	30%	30%
APPLY	20%	20%

**Programme : B.Sc Zoology**  
**Semester : IV**  
**Sub. Code : Z41**

**Part III: Core**  
**Hours : 4P/W 60Hrs P/S**  
**Credits: 4**

**TITLE OF THE PAPER: BIOCHEMISTRY**

<b>Pedagogy</b>	<b>Hours</b>	<b>Lecture</b>	<b>Peer Teaching</b>	<b>GD/VIDOES/TUTORIAL</b>	<b>ICT</b>	
	<b>4</b>	<b>2</b>	<b>-</b>	<b>1</b>	<b>1</b>	
<b>PREAMBLE:</b>  The course encourage the students to gain basic knowledge on biochemical's structure and to  know the functions and significance of biomolecules						
<b>COURSE OUTCOME</b> <b>At the end of the Semester, the Students will be able to</b>					<b>Unit</b>	<b>Hrs P/S</b>
<b>UNIT 1 -CO1: Give ideas to understand fundamental biochemical principles</b>					<b>1</b>	<b>10</b>
<b>UNIT 2 -CO2: Demonstrate an understanding of the</b>					<b>2</b>	<b>15</b>

<b>chemistry, structure and function of biological molecule.</b>		
<b>UNIT 3 -CO3: Provide knowledge regarding the regulation of various processes through enzymes</b>	<b>3</b>	<b>10</b>
<b>UNIT 4 -CO4: Explain biological mechanism, such as metabolism as chemical reactions</b>	<b>4</b>	<b>10</b>
<b>UNIT 5 -CO5: Describe the metabolic pathways and its biochemical significance</b>	<b>5</b>	<b>15</b>

## **SYLLABUS**

### **UNIT I:**

**Carbohydrates, Classification, properties and biological importance, Monosaccharides - glucose, fructose, Disaccharides - sucrose, maltose, Polysaccharides – starch.**

### **UNIT II:**

**Amino acids, General structure and classification, Protein classification, Structure of protein- primary secondary, tertiary and quaternary structure, Structure and functions of hemoglobin and collagen.**

### **UNIT III:**

**Lipids - Structure, Classification with examples, Simple lipids - tripalmitin, Compound lipids - lecithin, Derived lipid – cholesterol -Biological significance.**

### **UNIT IV:**

**Enzymes – properties, Enzyme classification, Enzyme kinetics – Michaelis Menton hypothesis, Factors affecting enzyme activity - pH, temperature, substrate concentration and enzyme concentration. Coenzymes.**

### **UNIT V:**

**Carbohydrate metabolism– glycolysis, Citric acid cycle. Protein metabolism-deamination, transamination Ornithine cycle. Lipid metabolism –  $\beta$  oxidation of fatty acids.**

### **TEXT BOOKS:**

**1. Dulsy Fathima, Narayanan LM, Meyyanpillai RP, NallaSingam K, Prasanna Kumar S and Arumugam N. Biochemistry. Saras Pub., 2015**

### **REFERENCES:**

- 1. Nelson DL, Cox MM, and Lehinger. Principles of Biochemistry. W. H. Freeman and Company, New York, 2007**
- 2. Stryer L. Biochemistry. 2nd Edn., W.H. Freeman and Company, New York, 1981**
- 3. West and Todd. Text book of Biochemistry. Oxford & IBH Pub.Pvt. Ltd., 2008**

**Course designer :Dr.S.Mala**

### **Course Contents and Lecture Schedule**

<b>UNITS</b>	<b>TOPIC</b>	<b>LECTURE HOURS</b>	<b>MODE OF TEACHING</b>
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<b>UNIT 1</b>			
1.1	<b>Carbohydrates</b>	1	<b>Lecture</b>
1.2	<b>Classification, properties and biological importance.</b>	3	<b>Charts-1 ,Lecture-2</b>
1.3	<b>Monosaccharides - glucose, fructose.</b>	2	<b>ICT-1,Lecture-1</b>
1.4	<b>Disaccharides - sucrose, maltose.</b>	2	<b>ICT-1,Lecture-1</b>
1.5	<b>Polysaccharides – starch.</b>	2	<b>ICT-1,Lecture-1</b>
<b>UNIT 11</b>			
2.1	<b>Amino acids</b>	2	<b>Lecture-2</b>
2.2	<b>General structure and classification.</b>	4	<b>Charts-1,Lecture-3</b>
2.3	<b>Protein classification</b>	3	<b>Lecture-3</b>
2.4	<b>Structure of protein- primary secondary, tertiary and quaternary structure</b>	3	<b>ICT-1,Lecture-2</b>
2.5	<b>Structure and functions of hemoglobin and collagen.</b>	3	<b>ICT-1,Lecture-2</b>
<b>UNIT III</b>			
3.1	<b>Lipids - Structure,</b>	2	<b>Charts-1,Lecture-1</b>
3.2	<b>Lipid Classification with examples</b>	1	<b>Lecture-1</b>
3.3	<b>Simple lipids - tripalmitin,</b>	2	<b>Models with Lecture-2</b>
3.4	<b>Compound lipids -lecithin,</b>	2	<b>Visual aids-1,Lecture-1</b>
3.5	<b>Derived lipid – cholesterol Biological significance.</b>	3	<b>ICT-1,Lecture-2</b>
<b>UNIT IV</b>			
4.1	<b>Enzymes - properties</b>	1	<b>Charts with Lecture -1</b>
4.2	<b>Enzyme Classification.</b>	3	<b>Chartswith Lecture -3</b>
4.3	<b>Enzyme kinetics - MichaelisMenton hypothesis.</b>	3	<b>Lecture-3</b>
4.4	<b>Factors affecting enzyme activity - pH, temperature, substrate concentration and enzyme concentration.</b>	2	<b>ICT -1,Lecture-1</b>
4.5	<b>Coenzymes.</b>	1	<b>Lecture -1</b>
<b>UNIT V</b>			
5.1	<b>Carbohydrate metabolism glycolysis</b>	4	<b>Charts-1 ,Lecture-3</b>
5.2	<b>Citric acid cycle.</b>	2	<b>Charts with Lecture -2</b>
5.3	<b>Protein metabolism- deamination, transamination</b>	3	<b>Lecture -3</b>
5.4	<b>Ornithine cycle.</b>	2	<b>Visual aids with explanations -2</b>
5.5	<b>Lipid metabolism – <math>\beta</math> oxidation of fatty acids.</b>	4	<b>ICT -1 ,Lecture -3</b>

Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							Mean scores of Cos
	PO 1	PO2	PO3	PO4	PO5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	
CO1	3	4	3	3	5	2	4	4	3	3	3	3	3.3
CO2	4	4	3	3	5	3	4	4	4	3	3	3	3.58
CO3	3	3	3	3	4	3	3	3	4	3	4	4	3.3
CO4	3	4	3	3	5	3	4	4	3	3	3	3	3.4
CO5	3	3	3	4	3	3	3	3	3	4	4	4	3.3
Mean Overall Score													3.38

**Result: The Score for this Course is 3.38 (High Relationship)**

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos \& PSOs}}$	Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$
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BLOOM'S TAXANOMY	INTERNAL	EXTERNAL
KNOWLEDGE	50%	50%
UNDERSTANDING	30%	30%
APPLY	20%	20%

**Programme : B.Sc ZOOLOGY**  
**Semester : IV**  
**Sub. Code : Z42**

**Part III: Core-8**  
**Hours : 4 P/W 60 Hrs P/S**  
**Credits: 4**

**TITLE OF THE PAPER: ANIMAL PHYSIOLOGY**

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDEOS/TUTORIAL	ICT
	4	1	-	2	1

**PREAMBLE:**

The students gain basic knowledge on physiology, understand the structure and functions of the human organs.

<b>COURSE OUTCOME</b> At the end of the Semester, the Students will be able to	<b>Unit</b>	<b>Hrs P/S</b>
<b>UNIT 1 - CO1:</b> To understand metabolic activities , and respiratory system of animals.	<b>1</b>	<b>10</b>
<b>UNIT 2 - CO2:</b> To gain the knowledge of circulatory system and excretory system of animals.	<b>2</b>	<b>15</b>
<b>UNIT 3- CO3:</b> To learn osmoregulation structure and types and function of Nervous system.	<b>3</b>	<b>15</b>
<b>UNIT 4 - CO4:</b> To know the structure and functions of the muscular system and understand the mechanism and physicochemical changes in muscle system.	<b>4</b>	<b>10</b>
<b>UNIT 5 - CO5:</b> To demonstrate the human reproductive organs and know the role of hormones and abnormalities and learn the chronobiology of animals	<b>5</b>	<b>10</b>

## **SYLLABUS**

**UNIT I: Digestion and absorption of carbohydrate, protein and lipid. Respiration - respiratory pigments - transport of respiratory gases - anaerobiosis - Respiratory Quotient.**

**UNIT II: Circulation - structure of heart, origin and conduction of heart beat. Mechanism of Blood coagulation. Excretion - types of nitrogenous wastes - ammonotelism, urotelism and uricotelism. Structure of the human nephron and mechanism of urine formation.**

**UNIT III: Osmoregulation – osmoregulators - osmoconformers - Stenohaline and Euryhaline - osmoregulation in fresh water and marine teleosts. Nervous system - structure and types of neurons - conduction of nerve impulse through and across neurons - synapse - Myoneural conduction - Reflex action - conditioned reflexes.**

**UNIT IV: Muscular system - types of muscle fibers - ultra structure of the skeletal muscle - contractile proteins - mechanism of muscle contraction - physicochemical changes during muscle contraction.**

**UNIT V: Receptors - structure and functioning of phonoreceptor (Human ear) and**

photoreceptor (Human eye). Human reproductive cycle, role of hormones and abnormalities. Chronobiology - biological clock- circadian and circannual rhythms.

**TEXT BOOKS:**

1. Arumugam A and Mariankuttikan A. Text Book of Animal Physiology. 9<sup>th</sup>Edn., 2014

**REFERENCES:**

1. Delela RC and Verma PS. Animal Physiology and related Biochemistry. 3<sup>rd</sup>Edn. S.Chand and Company, New Delhi, 1986
2. Hoar WS. General and Comparative Physiology. 2<sup>nd</sup>Edn., Prentice Hall of India Ltd., New Delhi, 1975
3. Verma PS and Agarwal VK. Animal Physiology. 6<sup>th</sup>Edn. S.Chand and Company., New Delhi, 1997

Course Designer: P. Yuvarani

**Course Content and Lecture Schedule**

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
<b>UNIT 1</b>			
1.1	Digestion and absorption of carbohydrate	2	Charts -1, Lecture – 1
1.2	Digestion and absorption of protein	2	Visual aids -1, Lecture – 1
1.3	Digestion and absorption of lipid	2	Charts -1, Lecture – 1
1.4	Respiration -respiratory pigments - transport of respiratory gases	2	Charts -1, Lecture – 1
1.5	anaerobiosis - Respiratory Quotient	2	Charts -1, Lecture – 1
<b>UNIT 11</b>			
2.1	Circulation - structure of heart, origin and conduction of heart beat	3	Visual aids -1, Lecture – 2
2.2	Mechanism of Blood coagulation.	2	Charts -1, Lecture – 1
2.3	Excretion - types of nitrogenous wastes - ammonotelism, urotelism and uricotelism.	4	Visual aids -2, Lecture - 2



2.4	Structure of the human nephron	3	Charts -2 ,Lecture -1
2.5	mechanism of urine formation	3	Charts -1 ,Lecture -2
<b>UNIT III</b>			
3.1	Osmoregulation - osmoregulators- osmoconformers - Stenohaline and Euryhaline	3	Lecture -2, Charts- 1
3.2	osmoregulation - fresh water and marine teleosts	3	Charts -1 , Lecture -2

3.3	Nervous system - structure and types of neurons	3	Visual aids -1, Lecture -2
3.4	Conduction of nerve impulse- synapse	3	Charts-1, Lecture -2
3.5	Myoneural conduction - Reflex action - conditioned reflexes	3	Visual aids- 1, Lecture -2

<b>UNIT IV</b>			
4.1	Muscular system-types and structure	3	Charts -1,Lecture -2
4.2	contractile proteins	2	Lecture -1, Charts-1
4.3	Mechanism Of Muscle Contraction	2	Visual aids-1,Lecture -1
4.4	Physicochemical Changes- During Muscle Contraction.	3	ICT-1, Lecture -1, Charts-1

<b>UNIT V</b>			
5.1	Receptors - structure and function - phonoreceptor	2	Chart- 1, Lecture -1
5.2	Photoreceptor	2	Chart- 1, Lecture -1
5.3	Human reproductive cycle	2	Chart- 1, Lecture -1
5.4	Role of hormones and abnormalities	2	Chart- 1, Lecture -1
5.5	Chronobiology- biological clock- circadian and circannual rhythms.	2	Chart- 1, Lecture -1

Course Outcomes (Cos)	Programme Outcomes (Pos)							Programme Specific Outcomes (PSOs)							Mean scores of Cos
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PS O1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	
CO1	3	4	3	3	5	3	3	2	4	4	3	3	3	3	3.28
CO2	4	3	3	4	3	5	3	3	3	4	4	4	3	4	3.57
CO3	3	4	5	3	3	3	3	4	4	4	4	3	3	3	3.5
CO4	5	4	3	3	3	3	3	3	3	3	3	4	4	4	3.57
CO5	3	3	3	5	4	3	3	4	4	3	3	4	4	3	3.50
<b>Mean Overall Score</b>															<b>3.48</b>

**Result: The Score for this Course is 3.48 (High Relationship)**

<b>Mapping</b>	<b>1-20%</b>	<b>21-40%</b>	<b>41-60%</b>	<b>61-80%</b>	<b>81-100%</b>
<b>Scale</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Relation</b>	<b>0.0-1.0</b>	<b>1.1-2.0</b>	<b>2.1-3.0</b>	<b>3.1-4.0</b>	<b>4.1-5.0</b>
<b>Quality</b>	<b>Very Poor</b>	<b>Poor</b>	<b>Moderate</b>	<b>High</b>	<b>Very High</b>
<b>Mean Score of COs = <math>\frac{\text{Total of Value}}{\text{Total No. of Pos \&amp; PSOs}}</math></b>			<b>Mean Overall Score of COs = <math>\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}</math></b>		
<b>BLOOM'S TAXANOMY</b>	<b>INTERNAL</b>		<b>EXTERNAL</b>		
<b>KNOWLEDGE</b>	<b>50%</b>		<b>50%</b>		
<b>UNDERSTANDING</b>	<b>30%</b>		<b>30%</b>		
<b>APPLY</b>	<b>20%</b>		<b>20%</b>		

Semester : V  
Sub. Code : Z51

Hours : 6 P/W 90 Hrs P/S  
Credits: 5

**TITLE OF THE PAPER: IMMUNOLOGY**

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDOES/TUTORIAL	ICT	
	6	2	-	2	2	
<b>PREAMBLE:</b>						
This course helps to understand the basic concept of immune system and immune response and gain knowledge in the immunodiagnosis of diseases.						
<b>COURSE OUTCOME</b>					<b>Unit</b>	<b>Hrs P/S</b>
<b>At the end of the Semester, the Students will be able to</b>						
<b>UNIT 1 - CO1: Define, discuss and explain the types of immunity. Compare and summarize the organs and cells of immune system.</b>					<b>1</b>	<b>17</b>
<b>UNIT 2 - CO2: Describe and compare antigenicity and immunogenicity. List and compare types of immunoglobulin and antigen antibody interactions. And summarize the compliment pathway.</b>					<b>2</b>	<b>22</b>
<b>UNIT 3 - CO3: Define and analyze types of immune responses and tumor immunity.</b>					<b>3</b>	<b>24</b>
<b>UNIT 4 - CO4: Define and compare types of hypersensitivity. Summarize and describe autoimmune disorder and immunodeficiency using examples.</b>					<b>4</b>	<b>13</b>
<b>UNIT 5 - CO5: Classify, explain and recommend types of vaccines. Understand and demonstrate a few of the important immunological techniques.</b>					<b>5</b>	<b>14</b>
<b>SYLLABUS</b>						
<b>UNIT I:</b>						
Introduction - History and scope of Immunology. Immunity - types of immunity - innate and acquired immunity - humoral and cell mediated immunity - active and passive immunity. Organs and cells of immune system- primary and secondary lymphoid organs. T cell, B cell, NK cell, dendritic cell, macrophage and granulocytes.						
<b>UNIT II:</b>						
Antigens - antigenicity, immunogenicity, haptens and types of antigens. Immunoglobulin- structure, types, biological properties and functions. Antigen and Antibody interactions - primary interactions - affinity and avidity - secondary interactions - applications of agglutination and precipitation reaction. Complement - classical and alternative pathways.						
<b>UNIT III:</b>						
Immune response - basic concepts of humoral immune response - primary and secondary immune response - cell mediated immune response - mechanism - cytokines MHC - a note on HLA and tissue transplantation. A brief account of tumour immunity - types, immune response.						
<b>UNIT IV:</b>						
Hypersensitivity-type I, type II, III, IV and V. Auto immune diseases -Rheumatoid Arthritis. Immunodeficiency - AIDS.						

**UNIT V:**

**Immunoprophylaxis - types of vaccines - live attenuated, killed. Recommended immunization schedule for children. Immunoassays - ELISA, RIA, Western blotting technique.**

**TEXT BOOKS:**

**Eli Benjamin. Immunology - A short course. A. John Wiley & Sons Pub., New York, 1996.**

**REFERENCES:**

- 1. GolKindt T J, Goldsby RA and Osborne BA. Kuby. Immunology. W. H. Freeman and Company, New York, 2007.**
- 2. Roitt I. Essential Immunology. Blackwell Science Pub., Oxford, 1997.**

**Course designer: Dr. Jothi Sam**

### Course contents and lecture schedule

<b>UNITS</b>	<b>TOPIC</b>	<b>LECTURE HOURS</b>	<b>MODE OF TEACHING</b>
<b>UNIT I</b>			
<b>1.1</b>	<b>Introduction - History and scope of Immunology. Immunity - types of immunity - innate and acquired immunity - humoral and cell mediated immunity - active and passive immunity.</b>	<b>6</b>	<b>Lecture - 4 Tutorial - 2</b>
<b>1.2</b>	<b>Organs of immune system- primary and secondary lymphoid organs.</b>	<b>5</b>	<b>Lecture - 3 Tutorial - 1 Video - 1</b>
<b>1.3</b>	<b>Cells of immune system - T cell, B cell, NK cell, dendritic cell, macrophage and granulocytes.</b>	<b>6</b>	<b>Lecture - 4 Tutorial - 1 ICT- 1</b>
<b>UNIT II</b>			
<b>2.1</b>	<b>Antigens - antigenicity, immunogenicity, haptens and types of antigens.</b>	<b>6</b>	<b>Lecture - 4 Tutorial - 1 ICT - 1</b>
<b>2.2</b>	<b>Immunoglobulin- structure, types, biological properties and functions.</b>	<b>5</b>	<b>Lecture - 3 Tutorial - 1 Video - 1</b>
<b>2.3</b>	<b>Antigen and Antibody interactions - primary interactions - affinity and avidity - secondary interactions - applications of agglutination and precipitation reaction.</b>	<b>7</b>	<b>Lecture - 5 Tutorial - 1 ICT - 1</b>
<b>2.4</b>	<b>Complement - classical and alternative pathways.</b>	<b>4</b>	<b>Lecture - 4</b>
<b>UNIT III</b>			
<b>3.1</b>	<b>Immune response - basic concepts of humoral immune response - primary and secondary immune response.</b>	<b>7</b>	<b>Lecture - 5 Tutorial - 1 Video - 1</b>
<b>3.2</b>	<b>Cell mediated immune response - mechanism - cytokines</b>	<b>7</b>	<b>Lecture - 5 Tutorial - 1</b>

			Video - 1
3.3	MHC - a note on HLA and tissue transplantation.	5	Lecture - 3 Tutorial - 1 ICT - 1
3.4	A brief account of tumour immunity - types, immune response.	5	Lecture - 3 Tutorial - 1 ICT - 1
<b>UNIT IV</b>			
4.1	Hypersensitivity-type I, type II, III, IV and V.	5	Lecture - 3 Tutorial - 2
4.2	Auto immune diseases - Rheumatoid Arthritis.	3	Lecture - 3
4.3	Immunodeficiency - AIDS.	5	Lecture - 3 Tutorial - 1 ICT - 1
<b>UNIT V</b>			
5.1	Immunoprophylaxis - types of vaccines - live attenuated, killed.	4	Lecture - 3 Tutorial - 1
5.2	Recommended immunization schedule for children.	2	Lecture - 2
5.3	Immunoassays - ELISA, RIA, Western blotting technique.	8	Lecture - 5 Tutorial - 2 ICT - 1

Course Outcomes (Cos)	Programme Outcomes (Pos)					Programme Specific Outcomes (PSOs)							Mean scores of Cos
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	
CO1	3.6	3.8	3.0	3.5	3.2	3.6	3.8	3.6	3.4	3.4	3.7	3.4	3.50
CO2	3.5	3.4	3.8	3.7	2.6	3.8	4.0	3.8	3.8	3.2	3.2	2.4	3.43
CO3	3.4	3.3	3.5	3.6	3.4	3.6	3.4	3.5	3.5	3.2	3.2	3.4	3.41
CO4	3.0	4.0	3.8	3.8	3.2	3.8	3.5	3.6	4	3.8	3.4	3.5	3.62
CO5	3.2	3.5	3.8	3.5	3.4	3.6	3.0	3.5	3.3	3.8	3.5	3.6	3.48
<b>Mean Overall Score</b>													<b>3.48</b>

**Result: The Score for this Course is 3.48 (High Relationship)**

Mapping	1-20%	21- 40%	41- 60%	61- 80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1- 4.0	4.1- 5.0
Quality	Very Poor	Poor	Moderate	High	Very High
Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos \& PSOs}}$			Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$		

BLOOM'S TAXANOMY	INTERNAL	EXTERNAL
KNOWLEDGE	50%	50%
UNDERSTANDING	30%	30%

APPLY	20%	20%
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Programme : B. Sc. Zoology  
Semester : V  
Sub. Code : Z52

Part III: Core  
Hours : 5 Hrs P/W 75 Hrs P/S  
Credits: 5

**TITLE OF THE PAPER: CELL AND MOLECULAR BIOLOGY**

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDOES/TUTORIAL	ICT	
	5	2	-	2	1	
<b>PREAMBLE:</b>						
This course helps to know the cell organelles and their properties and understand the functions of cell organelles at molecular level and also helps to understand the regulation of gene expression.						
<b>COURSE OUTCOME</b>					<b>Unit</b>	<b>Hrs P/S</b>
At the end of the Semester, the Students will be able to						
<b>UNIT 1 - CO1: Describe, relate and summarize the structure and functions of cell organelles in the cell.</b>					<b>1</b>	<b>17</b>
<b>UNIT 2 - CO2: Understand the structure and functions of nuclear components, and distinguish between mitosis and meiosis.</b>					<b>2</b>	<b>15</b>
<b>UNIT 3 - CO3: Analyze the structure and functions of DNA and RNA in the cell.</b>					<b>3</b>	<b>15</b>
<b>UNIT 4 - CO4: Discuss the mechanism associated with Gene expression and its regulation.</b>					<b>4</b>	<b>15</b>
<b>UNIT 5 - CO5: Define and identify different types of mutations and explain the causes of mutation.</b>					<b>5</b>	<b>13</b>
<b>SYLLABUS</b>						
<b>UNIT I:</b>						
Plasma membrane - ultra structure, biochemistry and functions. Cytoplasmic organelles - structure and functions of mitochondria, golgi apparatus, endoplasmic reticulum and ribosomes.						
<b>UNIT II:</b>						
Nuclear components - nucleus, nucleolus and nucleosomes, chromosomes - structure and types. Special types - giant - lampbrush chromosome and polytene chromosomes. Cell cycle and cell division - mitosis and meiosis.						
<b>UNIT III:</b>						

**DNA as a genetic material - experimental proof. DNA - structure. DNA replication. RNA – types - tRNA, mRNA and rRNA.**

**UNIT IV:**

**Genetic code- properties. Protein synthesis - mechanism - inhibitors of protein synthesis. Regulation of gene expression - Lac operon.**

**UNIT V:**

**Mutation - molecular basis of mutation. Mutagens - physical, chemical. Cancer Biology – oncogenes, types, causes, properties, apoptosis and treatment.**

**TEXT BOOKS:**

**Power CB. Cell Biology. 3<sup>rd</sup> Edn., Himalaya Pub., 1983**

**REFERENCES:**

- 1. Benjamin Lewi. Genes VII. Oxford University Press, New York., 2000**
- 2. David Ferifelder. Essentials of Molecular Biology. Narosa Pub., 2001**
- 3. Twyman R. M. Advanced Molecular Biology. Viva Books Pvt.,2002**
- 4. Verma P. S and Agarwal V. K. A Text Book of Cytology. S. Chand and Company, 1979**

**Course designer: Dr. Jothi Sam**

**Course contents and lecture schedule**

<b>UNITS</b>	<b>TOPIC</b>	<b>LECTURE HOURS</b>	<b>MODE OF TEACHING</b>
<b>UNIT I</b>			
<b>1.1</b>	<b>Plasma membrane - ultra structure, biochemistry and functions</b>	<b>5</b>	<b>Lecture - 3 Tutorial - 2</b>
<b>1.2</b>	<b>Cytoplasmic organelles - structure and functions of mitochondria</b>	<b>5</b>	<b>Lecture - 2 Tutorial - 2 Video - 1</b>
<b>1.3</b>	<b>Golgi apparatus, endoplasmic reticulum and ribosomes</b>	<b>7</b>	<b>Lecture - 5 Tutorial - 2</b>
<b>UNIT II</b>			
<b>2.1</b>	<b>Nuclear components - nucleus, nucleolus and nucleosomes</b>	<b>5</b>	<b>Lecture - 3 Tutorial - 2</b>
<b>2.2</b>	<b>Chromosomes - structure and types. Special types - giant - lamp brush chromosome and polytene chromosomes</b>	<b>5</b>	<b>Lecture - 3 Tutorial - 2</b>
<b>2.3</b>	<b>Cell cycle and cell division - mitosis and meiosis</b>	<b>5</b>	<b>Lecture – 3 Tutorial – 1 ICT - 1</b>
<b>UNIT III</b>			
<b>3.1</b>	<b>DNA as a genetic material – experimental</b>	<b>4</b>	<b>Lecture - 4</b>

	proof		
3.2	DNA - structure	4	Lecture - 3 Video - 1
3.3	DNA replication	4	Lecture - 3 Video - 1
3.4	RNA – types - tRNA, mRNA and rRNA	3	Lecture - 2 Tutorial - 1
<b>UNIT IV</b>			
4.1	Genetic code - properties	5	Lecture - 5
4.2	Protein synthesis - mechanism - inhibitors of protein synthesis	5	Lecture - 3 Tutorial - 1 ICT - 1
4.3	Regulation of gene expression - Lac operon	5	Lecture - 3 Tutorial - 2
<b>UNIT V</b>			
5.1	Mutation - molecular basis of mutation	4	Lecture - 4
5.2	Mutagens - physical, chemical	4	Lecture - 4
5.3	Cancer Biology – oncogenes, types, causes, properties, apoptosis and treatment	5	Lecture - 3 Tutorial - 2

Course Outcomes (Cos)	Programme Outcomes (Pos)					Programme Specific Outcomes (PSOs)							Mean scores of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	
CO1	3.4	3.6	3.5	3	3.2	3.8	4	3	3	2.5	3.2	3.4	3.30
CO2	3.2	4	3.7	3.2	2.8	3.6	4	3.2	2.8	2.8	3	3.2	3.29
CO3	3.4	3.6	3.6	3.4	3.6	3.4	3.8	3.4	3	3	3.6	3.5	3.44
CO4	3.5	3.4	3.5	3.7	3.5	3.2	3.8	3.6	3.2	3	3.8	3	3.43
CO5	3	3.2	3.6	3.5	3.2	3.3	3.6	3.6	4	3.2	3	3.6	3.40
<b>Mean Overall Score</b>													<b>3.37</b>

**Result: The Score for this Course is 3.37 (High Relationship)**

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High
Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos \& PSOs}}$			Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$		



<b>BLOOM'S TAXANOMY</b>	<b>INTERNAL</b>	<b>EXTERNAL</b>
<b>KNOWLEDGE</b>	<b>50%</b>	<b>50%</b>
<b>UNDERSTANDING</b>	<b>30%</b>	<b>30%</b>
<b>APPLY</b>	<b>20%</b>	<b>20%</b>

Programme : B.Sc  
Semester : V  
Sub. Code : PZ2

**CORE 11: PRACTICAL 2**  
Hours : 4P/W 60 Hrs P/S  
Credits: 2

**TITLE OF THE PAPER: CORE PRACTICAL – GENETICS, BIODIVERSITY AND EVOLUTION, BIOCHEMISTRY AND ANIMAL PHYSIOLOGY**

<b>Pedagogy</b>	<b>Hours</b>	<b>Demonstration</b>	<b>Peer Teaching</b>	<b>GD/VIDEOS/TUTORIAL</b>	<b>ICT</b>	
	<b>4</b>	<b>2</b>	<b>-</b>	<b>2</b>	<b>-</b>	
<b>PREAMBLE</b>						
The course will enable the students to gain practical knowledge about the principles and techniques involved in genetics, physiology, biochemistry and evolution.						
<b>COURSE OUTCOME</b>					<b>Unit</b>	<b>Hrs P/S</b>
At the end of the Semester, the Students will be able to						
<b>UNIT 1 - CO1: understand the principles of mendelian inheritance and significance of Barr body in human</b>					<b>1</b>	<b>8</b>
<b>UNIT 2 - CO2: enrich their knowledge about physiological parameters analysed and appreciate their function,</b>					<b>2</b>	<b>16</b>
<b>UNIT 3 - CO3: estimate the biomolecules , analyse their significance and demonstrate the various biotechniques</b>					<b>3</b>	<b>16</b>
<b>UNIT 4 - CO4: appreciate the diversity of flora and fauna, to demonstrate genetic drift and types of fossils</b>					<b>4</b>	<b>12</b>
<b>UNIT 5 - CO5: understand the evolutionary significance of , mimicry, coloration, mutation and variation</b>					<b>5</b>	<b>8</b>

## **SYLLABUS**

### **Genetics:**

A survey of Mendelian traits in man (in class population)

Identification of Barr body from human buccal smear.

**Spotters:** Klinefelter's, Turner's and Down's syndrome, Y-linked inheritance in man.

### **Physiology:**

Preparation of blood smear

Differential count of Leucocytes

Identification of Haemin crystals

Qualitative tests for excretory products of fish, bird and mammal

**Spotters:** Haemoglobinometer, Sphygmomanometer, Menstrual cycle ( Chart/photo)

### **Biochemistry:**

Qualitative tests for carbohydrates, proteins and fats

Paper chromatography – Circular

Quantitative estimation of Protein – Lowry *et al.*, method

**Spotters:** pH meter, Colorimeter, Centrifuge, Primary and Secondary structure of proteins

### **Biodiversity & Evolution**

Surveillance of flora and fauna in the campus – group study

Genetic drift – Demonstration using beads

**Spotters:** Types of fossils – molds, casts, putrified

Peripatus, Archeopteryx

Coloration-mimicry-lycodon, krait

Mutation- peppered moth, ancon sheep

Variation- study using fingerprints

### **REFERENCE BOOKS:**

1. Jayaraman J. Laboratory Manual in Biochemistry. New Age International Pub., 2006

2. Rajan S. and Selvi Christy.R. Experimental procedures in Life sciences, Anjaana Book House, 2012.

3. Wilson K and Walker J. Practical Biochemistry. Cambridge University Press, 1995

**Course designer: Dr.V.Kabila**

**Course contents and lecture schedule**

UNITS	TOPIC	PRACTICAL HRS.	MODE OF TEACHING
<b>UNIT I</b>			
1.1	Genetics: A survey of Mendelian traits in man (in class population)	4	Tutorial-4
1.2	Spotters: Klinefelter's, Turner's and Down's syndrome, Y-linked inheritance in man.	4	Tutorial-4
<b>UNIT II</b>			
2.1	Physiology: Preparation of blood smear; Differential count of Leucocytes; Identification of Haemin crystals	10	Demo-5 Tutorial-5
2.2	Qualitative tests for excretory products of fish, bird and mammal <b>Spotter:</b> Haemoglobinometer, Sphygmomanometer, Menstrual cycle	6	Demo-3 Tutorial-3
<b>UNIT- III</b>			
3.1	Biochemistry: Qualitative tests for carbohydrates, proteins and fats- Paper chromatography – Circular	8	Demo-4 Tutorial-4
3.2	Quantitative estimation of Protein – Lowry <i>et al.</i> , method <b>Spotters:</b> pH meter, Colorimeter, Centrifuge, Primary and Secondary structure of proteins	8	Demo-4 Tutorial-4
<b>UNIT IV</b>			
4.1	Surveillance of flora and fauna in the campus – group study.Genetic drift – Demonstration using beads <b>Spotters:</b> Types of fossils – molds, casts, putrified	12	Demo-4 Tutorial-8
<b>UNIT V</b>			
5.1	Spotters: Peripatus, Archeoptery; Coloration--mimicry-lycodon, krait; Mutation- peppered moth, ancon sheep; Variation- study using fingerprints	8	Tutorial-8

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							Mean scores of Cos
	PO1	PO2	PO3	PO4	PO5	PS O1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	
CO1	3.8	3.7	3.7	3.5	3.5	3.9	3.0	3.7	3.8	3.1	2.9	3.2	3.48
CO2	3.6	3.7	3.6	3.3	3.7	3.7	3.4	3.4	3.7	3.2	3.8	3.3	3.53
CO3	3.5	3.4	3.4	3.5	3.7	3.5	3.3	3.5	3.8	3.3	3.7	3.2	3.48
CO4	3.3	3.2	3.4	3.2	3.3	3.3	3.2	3.0	3.1	3.2	3.0	3.0	3.18
CO5	3.2	3.6	3.1	3.2	3.2	3.4	3.3	3.3	3.0	3.0	3.0	3.0	3.19
<b>Mean Overall Score</b>													<b>3.37</b>

**Result: The Score for this Course is 3.37 (High Relationship)**

<b>Mapping</b>	<b>1-20%</b>	<b>21-40%</b>	<b>41-60%</b>	<b>61-80%</b>	<b>81-100%</b>
<b>Scale</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Relation</b>	<b>0.0-1.0</b>	<b>1.1-2.0</b>	<b>2.1-3.0</b>	<b>3.1-4.0</b>	<b>4.1-5.0</b>
<b>Quality</b>	<b>Very Poor</b>	<b>Poor</b>	<b>Moderate</b>	<b>High</b>	<b>Very High</b>
<b>Mean Score of COs = <math>\frac{\text{Total of Value}}{\text{Total No. of Pos \&amp; PSOs}}</math></b>			<b>Mean Overall Score of COs = <math>\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}</math></b>		

<b>BLOOM'S TAXANOMY</b>	<b>INTERNAL</b>	<b>EXTERNAL</b>
<b>KNOWLEDGE</b>	<b>50%</b>	<b>50%</b>
<b>UNDERSTANDING</b>	<b>30%</b>	<b>30%</b>
<b>APPLY</b>	<b>20%</b>	<b>20%</b>

**Programme : B.Sc ZOOLOGY**  
**Semester : VI**  
**Sub.Code : PZ3**

**Part III: Core11**  
**Hours : 4P/W 60Hrs P/S**  
**Credits:2**

**TITLE OF THE PAPER: CORE 11. PRACTICAL 3  
IMMUNOLOGY , CELL & MOLECULAR BIOLOGY , BIOPHYSICS &  
BIOSTATISTICS, MICROBIOLOGY AND BIOTECHNOLOGY**

<b>Pedagogy</b>	<b>Hours</b>	<b>Lecture</b>	<b>Peer teaching</b>	<b>GD/VIDEOS/TUTORIAL</b>	<b>ICT</b>
	<b>4</b>	<b>4</b>	<b>-</b>	<b>-</b>	<b>-</b>

**PREAMBLE**

**The students will enrich their knowledge on immunology, cell biology, microbiology, biotechnology and biostatistics and apply these techniques in various fields of Zoology.**

<b>COURSE OUTCOME</b>	<b>Unit</b>	<b>Hrs P/S</b>
<b>At the end of the Semester, the Students will be able to</b>		
<b>UNIT 1 CO1: Identify blood groups</b>	<b>1</b>	<b>15</b>
<b>UNIT2 CO2: Learn clinical procedures for cell division</b>	<b>2</b>	<b>15</b>
<b>UNIT3 CO3: Analyze the statistical datas</b>	<b>3</b>	<b>15</b>

<b>UNIT4 CO4: Learn the techniques of plating, staining, electrophoresis, DNA extraction</b>	<b>4</b>	<b>15</b>
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## **SYLLABUS**

### **Immunology:**

**Blood grouping test– ABO & Rh**

**Demonstration of Single Radial Immuno Diffusion**

**Spotters: Lymphoid organs, ELISA, Hybridoma Technology.**

### **Cell and Molecular Biology:**

**Mitosis in onion root tip**

**Giant chromosomes in Chironomous larva**

**Spotters: DNA structure – model, structure of tRNA (Clover leaf model).**

### **Biophysics & Biostatistics:**

**Calculation of mean, median, mode, standard deviation and standard error.**

**Spotter: Osmosis**

### **Microbiology:**

**Plating technique – Spread and Streak**

**Gram's staining**

**Hanging drop experiment**

**Screening of antimicrobial agents (Kirby Bauer method)**

**Spotters: Compound microscope, Laminar Air Flow, Autoclave, Incubator, Hot Air Oven, Colony counter.**

### **Biotechnology:**

**Demonstration of SDS PAGE and Agarose Gel electrophoresis**

**Extraction of DNA from tissue (liver)**

**Spotters : pBR 322, Cosmid, Microinjection, PCR**

### **Reference Books:**

- 1. Dubey RC and Maheswari DK. Practical Microbiology. S. Chand and Company, New Delhi, 2008**
- 2. Gunasekaran P. Laboratory Manual in Microbiology. New Age International Ltd. Pub., 2009**
- 3. Palanichamy S and Manoharan. Statistical Methods for Biologists. Paramount Pub., 2008**

**4. Subramanian MA. Biophysics - Principles & Techniques. MJP Pub., Chennai, 2005**

Course Designer : Mrs. N. AMUTHA

**Content and Lecture Schedule**

<b>UNITS</b>	<b>TOPIC</b>	<b>LECTURE HOURS</b>	<b>MODE OF TEACHING</b>
<b>UNIT 1</b>			
	<b>Blood grouping test– ABO &amp; Rh</b>	<b>5</b>	<b>Demo-2 Tutorial-3</b>
	<b>Demonstration of Single Radial Immuno Diffusion</b>	<b>5</b>	<b>Demo-2 Tutorial-3</b>
	<b>Spotters: Lymphoid organs, ELISA, Hybridoma Technology.</b>	<b>5</b>	<b>Lecture - 2 Demo-3</b>
<b>UNIT 2</b>			
	<b>Mitosis in onion root tip</b>	<b>5</b>	<b>Demo-2 Tutorial-3</b>
	<b>Giant chromosomes in Chironomous larva</b>	<b>5</b>	<b>Demo-2 Tutorial-3</b>
	<b>Spotters: DNA structure – model, structure of tRNA (Clover leaf model).</b>	<b>5</b>	<b>lecture – 2 Demo-3</b>
<b>UNIT 3</b>			
	<b>Calculation of mean, median, mode</b>	<b>5</b>	<b>Tutorial-5</b>
	<b>Calculation of standard deviation and standard error.</b>	<b>5</b>	<b>Tutorial-5</b>
	<b>Spotter: Osmosis</b>	<b>5</b>	<b>Lecture - 2 demonstration-3</b>
<b>UNIT 4</b>			
	<b>Plating technique – Spread and Streak Gram's staining - Hanging drop experiment - Screening of antimicrobial agents (Kirby Bauer method)</b>	<b>5</b>	<b>Deno-5</b>
	<b>Spotters: Compound microscope, Laminar Air Flow, Autoclave, Incubator, Hot Air Oven, Colony counter.</b>	<b>5</b>	<b>Lecture - 2 demonstration-3</b>
	<b>Demonstration of SDS PAGE and Agarose Gel electrophoresis Extraction of DNA from tissue (liver) Spotters : pBR 322, Cosmid, Microinjection, PCR</b>	<b>5</b>	<b>Lecture - 2 demonstration-3</b>

Course Outcomes (Cos)	Programme outcomes (POs)					Programme specific outcomes (PSOs)							Mean Scores Of Cos
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	
CO 1	4	4	2	3	4	4	4	2	3	3	3	3	3.25
CO 2	3	4	3	3	4	4	3	3	4	3	3	3	3.33
CO 3	3	3	3	3	4	4	4	3	3	3	3	3	3.25
CO 4	3	3	4	3	3	4	4	3	3	3	3	2	3.16
<b>Mean overall score</b>												<b>3.24</b>	

**Result: The score for this course is 3.24 (High relationship)**

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High
Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos \& PSOs}}$			Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$		

BLOOM'S TAXANOMY	INTERNAL	EXTERNAL
KNOWLEDGE	50%	50%
UNDERSTANDING	30%	30%
APPLY	20%	20%

Programme : B.Sc., ZOOLOGY  
 Semester : VI  
 Sub. Code : Z61

Part III: Core12  
 Hours : 4 P/W 60 Hrs P/S  
 Credits : 4

**TITLE OF THE PAPER: \_BIOPHYSICS AND BIOSTATISTICS**

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDOES/TUTORIAL	ICT	
	4	2	--	1	1	
<b>PREAMBLE:</b> Provide an advanced understanding of the core principles in biophysics, understand the concepts in biostatistics and apply the statistical techniques in analyzing the biological data.						
<b>COURSE OUTCOME</b>					<b>Unit</b>	<b>Hrs P / S</b>
At the end of the Semester, the Students will be able to						
<b>UNIT 1 CO1:</b> Describe the concepts of electro kinetic properties of biomolecules.					1	7
<b>UNIT 2 CO2:</b> Analyse biophysical principles in neuromuscular conduction.					2	8
<b>UNIT 3 CO3:</b> Understand the theoretical aspects of data collection and processing.					3	15
<b>UNIT 4 CO4:</b> Apply the formula for calculating central measures of tendency and dispersion.					4	15
<b>UNIT 5 CO5:</b> Analyse and calculate Pearson's correlation coefficient, interpret regression equations and evaluate chi square test					5	15
<b>SYLLABUS</b>						
<b>UNIT I:</b> Colloids - types, properties, electro kinetic properties, Donnan equilibrium, Tyndal effect, surface tension, Brownian movement, filtration, osmosis, dialysis, adsorption.						



**UNIT II: Laws of thermodynamics - Biophysical principles in neuromuscular conduction – membrane**

**transport mechanism - Bioluminescence.**

**UNIT III: Collection of data - primary and secondary data - types of sampling: random and stratified**

**Sampling. Processing of data - classification and tabulation. Re presentation of data - diagrammatic and graphic.**

**UNIT IV: Measures of central tendency - mean, median and mode. Measures of dispersion - standard**

**deviation, standard error, variance and coefficient of variation.**

**UNIT V: Chi square analysis, types of correlation and regression, Karl Pearsons correlation coefficient.**

**TEXT BOOKS: 1. Ramakrishnan P . Biostatistics. Saras Pub ., 2015  
2. Thiraviaraj S. Biophysics. Saras Pub., 2010**

**REFERENCE BOOKS:**

- 1. Daniel WW. Biostatistics – A foundation for analysis in health sciences. Wiley Student Edn., 2005**
- 2. Gurumani N . An introduction to Biostatistics. MJP Pub., 2004**
- 3. Palanisamy S. and Manoharan M . Statistical methods for Biologists. Palani paramount Pub., 1990**
- 4. Subramanian M.A., Biophysics – Principles & Techniques, MJP Publishers, 2005**

**Course Designer : Dr.E. Emimal Victoria**

### **Course Content and Lecture Schedule**

<b>UNITS</b>	<b>TOPIC</b>	<b>LECTURE HOURS</b>	<b>MODE OF TEACHING</b>
<b>UNIT 1</b>			
<b>1.1</b>	<b>: Colloids – types, properties</b>	<b>2</b>	<b>Lecture</b>
<b>1.2</b>	<b>: Electro Kinetic properties, Donnan equilibrium</b>	<b>2</b>	<b>Lecture</b>
<b>1.3</b>	<b>: Tyndal effect, Surface tension</b>	<b>2</b>	<b>Lecture</b>
<b>1.4</b>	<b>: Brownian movement, filtration</b>	<b>3</b>	<b>Lecture -2 ICT - 1</b>
<b>1.5</b>	<b>: Osmosis, dialysis, adsorption</b>	<b>3</b>	<b>Lecture -2 ICT - 1</b>
<b>UNIT 11</b>			
<b>1.1</b>	<b>: Laws of thermodynamics</b>	<b>2</b>	<b>Lecture</b>
<b>1.2</b>	<b>: Biophysical principles in nerve impulse conduction</b>	<b>2</b>	<b>Lecture</b>
<b>1.3</b>	<b>: Biophysical principles in muscular conduction</b>	<b>2</b>	<b>ICT</b>

<b>1.4 : Membrane transport mechanism</b>	<b>3</b>	<b>Lecture -2 Tutorial - 1</b>
<b>1.5 : Bioluminescence</b>	<b>2</b>	<b>Tutorial</b>
<b>UNIT III</b>		
<b>1.1 : Primary and secondary collection of data</b>	<b>2</b>	<b>Lecture</b>
<b>1.2 : Types of sampling – random and stratified</b>	<b>2</b>	<b>Lecture</b>
<b>1.3 : Processing of data – classification and tabulation</b>	<b>3</b>	<b>Lecture -2 Tutorial - 1</b>
<b>1.4 : Diagramatic representation of data</b>	<b>4</b>	<b>Lecture -3 Tutorial - 1</b>
<b>1.5 : Graphic representation of data</b>	<b>2</b>	<b>ICT</b>
<b>UNIT IV</b>		
<b>1.1 : Measures of central tendency</b>	<b>3</b>	<b>Lecture - 2 ICT - 1</b>
<b>1.2 : Calculation of mean, median and mode</b>	<b>3</b>	<b>Lecture - 2 ICT - 1</b>
<b>1.3 : Measures of dispersion</b>	<b>2</b>	<b>Lecture -1 Tutorial -1</b>
<b>1.4 : Standard deviation, standard error</b>	<b>2</b>	<b>Lecture -1 Tutorial -1</b>
<b>1.5 : Variance and coefficient of variation</b>	<b>2</b>	<b>Lecture - 1 ICT - 1</b>
<b>UNIT V</b>		
<b>1.1 : Chi square analysis</b>	<b>2</b>	<b>ICT</b>
<b>1.2 : Types of correlation</b>	<b>2</b>	<b>Lecture</b>
<b>1.3 : Types of regression</b>	<b>2</b>	<b>Lecture</b>
<b>1.4 : Correlation coefficient</b>	<b>3</b>	<b>Lecture - 2 ICT -1</b>
<b>1.5 : Karl Pearsons coefficient</b>	<b>3</b>	<b>Lecture -2 Tutorial - 1</b>

Course Outcomes (Cos)	Programme Outcomes (Pos)					Programme Specific Outcomes (PSOs)							Mean scores of Cos
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	
CO1	2.5	3	4	4	2.5	3	3.7	4	2	2.3	4	4	3.3
CO2	3.5	2.5	4	2	4	3	4	4	3	3	4	2	3.3
CO3	3	2	4	4	3	3.7	3.3	4	2.5	4	3	3.5	3.4
CO4	3	2	3.5	4	4.5	2	3.3	4	3	4	3.7	2	3.3
CO5	2	2.5	3.5	4	3	2	3	4.5	2.5	4.5	3.5	2	3.3
<b>Mean Overall Score</b>													<b>3.32</b>

**Result: The Score for this Course is 3.32 (High Relationship)**

<b>Mapping</b>	<b>1-20%</b>	<b>21-40%</b>	<b>41-60%</b>	<b>61-80%</b>	<b>81-100%</b>
<b>Scale</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Relation</b>	<b>0.0-1.0</b>	<b>1.1-2.0</b>	<b>2.1-3.0</b>	<b>3.1-4.0</b>	<b>4.1-5.0</b>
<b>Quality</b>	<b>Very Poor</b>	<b>Poor</b>	<b>Moderate</b>	<b>High</b>	<b>Very High</b>
<b>Mean Score of COs = <math>\frac{\text{Total of Value}}{\text{Total No. of Pos \&amp; PSOs}}</math></b>			<b>Mean Overall Score of COs = <math>\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}</math></b>		

<b>BLOOM'S TAXANOMY</b>	<b>INTERNAL</b>	<b>EXTERNAL</b>
<b>KNOWLEDGE</b>	<b>50%</b>	<b>50%</b>
<b>UNDERSTANDING</b>	<b>30%</b>	<b>30%</b>
<b>APPLY</b>	<b>20%</b>	<b>20%</b>

**Programme : B.Sc., Zoology**  
**Semester : VI**  
**Sub. Code : Z62**

**Part III: Core**  
**Hours : 5 hrs P/W , 75 Hrs P/S**  
**Credits : 5**

**TITLE OF THE PAPER: GENERAL MICROBIOLOGY**

<b>Pedagogy</b>	<b>Hours</b>	<b>Lecture</b>	<b>Peer Teaching</b>	<b>GD/VIDEOS/TUTORIAL</b>	<b>ICT</b>	
	<b>5</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	
<b>PREAMBLE: Impart knowledge on systematic classification of microbes, morphological characteristics and understanding their practical significance</b>						
<b>COURSE OUTCOME</b>					<b>Unit</b>	<b>Hrs P/S</b>

<b>At the end of the Semester, the Students will be able to</b>		
<b>UNIT 1 CO1: Gain knowledge on classification and scope of microbes, Elucidate methods of sterilization and integrate the processes on microbial control</b>	<b>1</b>	<b>16</b>
<b>UNIT 2 CO2: Classify bacteria, acquire knowledge on its structure and demonstrate in-vitro culture methods</b>	<b>2</b>	<b>16</b>
<b>UNIT 3 CO3: Describe growth factors and associate nutritional importance and metabolic processes</b>	<b>3</b>	<b>15</b>
<b>UNIT 4 CO4: Characterize fungi based on morphology and classify based on morphological variation</b>	<b>4</b>	<b>12</b>
<b>UNIT 5 CO5: Classify and explain virus based on structure and genetic material</b>	<b>5</b>	<b>16</b>

## **SYLLABUS**

**UNIT I: History and Application of microbiology – role of microbes in genetic engineering & biotechnology, Environmental microbiology, Pollution microbiology, Medical microbiology and Agriculture (brief account only). Whittaker’s classification of Microorganism. Sterilization - principles - dry heat, moist heat, radiation, filtration, disinfection and disinfecting agents.**

**UNIT II: Bacteria – classification, fine structure of bacterial cell, Chemical composition and characteristics of Gram positive and Gram negative bacteria. Culture of bacteria – Types of culture media, culture methods and cultural characteristics.**

**UNIT III: Bacterial growth – Classification based on nutritional requirements for bacterial growth. Bacterial metabolism - respiration, fermentation.**

**UNIT IV: Fungi - general characteristics, morphology (pencilium and yeast) and classification.**

**UNIT V: Virus - general properties, structure and classification based on genetic material. Cultivation – isolation and identification of viruses.**

### **TEXT BOOKS:**

- 1. Dubey RC and Maheswari DK. A Text Book of Microbiology. S. Chand and Company, New Delhi, 2013**

### **REFERENCES:**

- 1. Ananthanarayan R and Paniker CKJ. Text Book of Microbiology. 6<sup>th</sup>Edn., Orient Longman Ltd. 2001**
- 2. Pelczar Jr. MJ, Chan ECS and Kreig NR. Microbiology. 5<sup>th</sup>Edn., Tata McGraw Hill Pub. Ltd., New Delhi, 2013**
- 3. Prescott IM, Harley JP and Klein DK. Microbiology. 2<sup>nd</sup>Edn., WMC Brown Pub., 1993**

**Course designer: Dr.D. Helen Christina**

**Course contents and lecture schedule**

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
<b>UNIT I</b>			
1.1	History and Application of microbiology – role of microbes in genetic engineering & biotechnology, Environmental microbiology, Pollution microbiology, Medical microbiology and Agriculture (brief account only).	6	Lecture-4, Peer teaching-2
1.2	Whittaker's classification of Microorganism.	4	Lecture-3, GD-1
1.3	Sterilization - principles - dry heat, moist heat, radiation, filtration disinfection and disinfecting agents	5	Lecture-4, ICT-1
<b>UNIT II</b>			
2.1	Bacteria – classification, fine structure of bacterial cell	4	Lecture-3, Video-1
2.2	Chemical composition and characteristics of Gram positive and Gram negative bacteria.	5	Lecture-4, ICT-1
2.3	Culture of bacteria – Types of culture media	4	Lecture-3, tutorial-1
2.4	culture methods and cultural characteristics	3	Lecture-2, tutorial-1
<b>UNIT III</b>			
3.1	Bacterial growth - nutritional classification for bacterial growth	5	Lecture-4, Peer learning-1
3.2	Bacterial metabolism – respiration-	5	Lecture-4, ICT-1
3.3	Bacterial metabolism - fermentation	5	Lecture-4, ICT-1
<b>UNIT IV</b>			
4.1	Fungi - general characteristics	4	Lecture-3, GD-1
4.2	Morphology (pencilium and yeast)	4	Lecture-3, ICT-1
4.3	Fungi - classification	4	Lecture-3, Peer learning-1
<b>UNIT V</b>			
5.1	Virus - general properties, structure	5	Lecture-4, tutorial-1
5.2	Classification based on genetic material	6	Lecture-4 ICT-2
5.3	Cultivation – isolation and identification of viruses.	5	Lecture-4, tutorial-1

Course Outcomes (COs)	Programme Outcomes (Pos)					Programme Specific Outcomes (PSOs)							Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	

CO1	4	4	3	3	2	4	4	4	4	2	3	3	3.3
CO2	4	4	4	4	2	4	4	4	3	2	3.5	3.5	3.5
CO3	4	4	4	3	3	4	4	4	3	2	3.5	3.5	3.5
CO4	4	4	3	3	3	4	4	4	4	3	3	3	3.5
CO5	4	4	4	3	3	4	4	4	4	2	3	3	3.5
	<b>Mean Overall Score</b>												<b>3.46</b>

**Result: The Score for this Course is 3.46 (High Relationship)**

<b>Mapping</b>	<b>1-20%</b>	<b>21-40%</b>	<b>41-60%</b>	<b>61-80%</b>	<b>81-100%</b>
<b>Scale</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Relation</b>	<b>0.0-1.0</b>	<b>1.1-2.0</b>	<b>2.1-3.0</b>	<b>3.1-4.0</b>	<b>4.1-5.0</b>
<b>Quality</b>	<b>Very Poor</b>	<b>Poor</b>	<b>Moderate</b>	<b>High</b>	<b>Very High</b>
<b>Mean Score of COs = <math>\frac{\text{Total of Value}}{\text{Total No. of Pos \&amp; PSOs}}</math></b>			<b>Mean Overall Score of COs = <math>\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}</math></b>		

<b>BLOOM'S TAXANOMY</b>	<b>INTERNAL</b>	<b>EXTERNAL</b>
<b>KNOWLEDGE</b>	<b>50%</b>	<b>50%</b>
<b>UNDERSTANDING</b>	<b>30%</b>	<b>30%</b>
<b>APPLY</b>	<b>20%</b>	<b>20%</b>

**Programme : B.Sc. ZOOLOGY**  
**Semester : VI**  
**Sub. Code : Z63**

**Part III: Core**  
**Hours : 5 Hrs P/W 75 Hrs P/S**  
**Credits: 5**

**TITLE OF THE PAPER: BIOTECHNOLOGY**

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDOES/TUTORIAL	ICT	
	5	2	-	2	1	
<p><b>PREAMBLE:</b>            This course helps to gain knowledge on basic techniques and tools of biotechnology and develop an understanding of its application in industrial processes for production of biocompounds.</p>						
<b>COURSE OUTCOME</b>					<b>Unit</b>	<b>Hrs P/S</b>
At the end of the Semester, the Students will be able to						
<b>UNIT 1 CO1: Understand, decide, design and apply the appropriate genetic engineering tools.</b>					<b>1</b>	<b>17</b>
<b>UNIT 2 CO2: Outline the fundamental steps in the genetic engineering procedures and explain the steps of PCR and its applications.</b>					<b>2</b>	<b>16</b>
<b>UNIT 3 CO3: Explain and analyze the steps involved in the production of bioproducts and their applications.</b>					<b>3</b>	<b>14</b>
<b>UNIT 4 CO4: Discuss the scope and role of medical biotechnology in the healthcare industry.</b>					<b>4</b>	<b>15</b>
<b>UNIT 5 CO5: Describe and summarize the methods and types of cell culture. Define and illustrate the development of GMOs. Justify societal, health, safety and legal issues and understand his/her responsibilities in biotechnological engineering practices.</b>					<b>5</b>	<b>13</b>
<b>SYLLABUS</b>						
<p><b>UNIT I:</b>            Biotechnology- definition, history and scope. Recombinant DNA technology – Molecular tools (enzymes), cloning vectors – (plasmids - types, bacteriophages, cosmids, artificial chromosomal vectors - YAC, shuttle vectors).</p>						
<p><b>UNIT II:</b>            Cloning strategies-core techniques - gene manipulation, cutting and joining DNA-construction of genomic and cDNA libraries - PCR - methods and application.</p>						
<p><b>UNIT III:</b>            Industrial Biotechnology - enzyme production from microbes, applications and enzyme immobilization. Production of single cell protein – Spirullina. Biofertilizer - Azospirillum. Biopesticides - <i>Bacillus thuringiensis</i>. Biopolymers – <i>Xanthomonas campestris</i>.</p>						
<p><b>UNIT IV:</b>            Medical Biotechnology - production of pharmaceutical products (insulin, interferon, recombinant vaccines - HBV). Gene therapy methods. Production of monoclonal antibodies and their applications.</p>						
<p><b>UNIT V:</b>            Animal Biotechnology - cell culture - types of culture. Development and application of</p>						

transgenic mice and fish- ethics - patent - IPR.

**TEXT BOOKS:**

Kumaresan V. Biotechnology. Saras Pub., 2016

**REFERENCES:**

1. Brown T A. Gene Cloning: An Introduction. 4<sup>th</sup> Edn., Black Bell Science Ltd., New Delhi, 2001.
2. Dubey RC. A text book of Biotechnology. Multicolor illustrative Edn., S. Chand and Company, New Delhi, 2006.
3. Primrose SB. Principles of Gene manipulation. 6<sup>th</sup> Edn., Black Bell Science Ltd., New Delhi, 2003.
4. Satyanarayana U. Biotechnology 1<sup>st</sup> Edn., Books and Allied (P) Ltd., Kolkata, 2009.
5. Singh BD. Biotechnology 2<sup>nd</sup> Edn., Kalyani Pub., Chennai, 2005.

Course designer: Dr. Jothi Sam

**Course contents and Lecture schedule**

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
<b>UNIT I</b>			
1.1	Biotechnology- definition, history and scope.	2	Lecture - 2
1.2	Recombinant DNA technology – Molecular tools (enzymes)	7	Lecture - 5 ICT - 2
1.3	Cloning vectors – plasmids - types, bacteriophages, cosmids, artificial chromosomal vectors - YAC, shuttle vectors.	8	Lecture - 4 Tutorial - 2 ICT - 2
<b>UNIT II</b>			
1.1	Cloning strategies-core techniques - gene manipulation.	3	Lecture - 3
1.2	Cutting and joining DNA	5	Lecture - 2 Tutorial - 2 Video - 1
1.3	Construction of genomic and cDNA libraries	4	Lecture - 3 ICT - 1
1.4	PCR - methods and application.	4	Lecture - 2 Tutorial - 1 Video - 1
<b>UNIT III</b>			
1.1	Industrial Biotechnology - enzyme production from microbes, applications and enzyme immobilization.	4	Lecture - 2 Tutorial - 2
1.2	Production of single cell protein – Spirullina.	4	Lecture - 2 Tutorial - 2
1.3	Biofertilizer - Azospirillum. Biopesticides - <i>Bacillus thuringiensis</i> .	4	Lecture - 2 Tutorial - 2



1.4	Biopolymers – <i>Xanthomonas campestris</i> .	2	Lecture - 2
<b>UNIT IV</b>			
1.1	Medical Biotechnology - production of pharmaceutical products insulin, interferon, recombinant vaccines - HBV.	7	Lecture - 5 Tutorial - 2
1.2	Gene therapy methods.	4	Lecture - 2 Tutorial - 2
1.3	Production of monoclonal antibodies and their applications.	4	Lecture - 2 Tutorial - 2
<b>UNIT V</b>			
1.1	Animal Biotechnology - cell culture - types of culture.	5	Lecture - 2 Tutorial - 2 ICT - 1
1.2	Development and application of transgenic mice and fish	4	Lecture - 3 ICT - 1
1.3	Ethics - patent - IPR.	4	Lecture - 4

Course Outcomes (Cos)	Programme Outcomes (Pos)					Programme Specific Outcomes (PSOs)							Mean scores of Cos
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	
CO1	3.7	3.4	3.8	3.6	3.5	3.5	3.5	3.6	3.2	3.7	3.2	3.5	3.52
CO2	3.8	3.2	3.6	3.8	3.7	3.2	3.7	3.5	3.2	3.6	3.5	3.7	3.54
CO3	3.4	3.4	3.7	4	3.8	3.5	3.2	3.7	3.8	3.5	3.8	3.2	3.58
CO4	3.2	3.2	3.5	3.8	4	3.4	3.4	3.6	4	3.2	3.4	3.8	3.54
CO5	3.3	3.6	3.2	3.7	3.8	3.2	3.2	3.4	3.7	3.5	3.4	3.7	3.48
<b>Mean Overall Score</b>													<b>3.53</b>

**Result: The Score for this Course is 3.53 (High Relationship)**

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High
Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos \& PSOs}}$			Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$		

BLOOM'S TAXANOMY	INTERNAL	EXTERNAL
KNOWLEDGE	50%	50%
UNDERSTANDING	30%	30%
APPLY	20%	20%

Programme : B.Sc ZOOLOGY  
 Semester : V  
 Sub. Code : EZ51

Part III: Elective  
 Hours : 5P/W 75Hrs P/S  
 Credits: 5

**TITLE OF THE PAPER: HUMAN NUTRITION**

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDOES/TUTORIAL	ICT	
	5	2	-	2	1	
<b>PREAMBLE:</b>						
The Course will provide self equip on health care and health education and find placement in health care sector.						
<b>COURSE OUTCOME</b>					<b>Unit</b>	<b>Hrs P/S</b>
At the end of the Semester, the Students will be able to						
<b>UNIT 1 - CO1: To understand the food requirements of human.</b>					<b>1</b>	<b>15</b>
<b>UNIT 2 - CO2: To explain the knowledge of Vitamins and minerals and to know the value of water nutrients</b>					<b>2</b>	<b>15</b>
<b>UNIT 3 - CO3: To analyses the calorific value of food, Energy requirements of different aged persons, nutritional requirements different aged persons, to understand health education, malnutrition.</b>					<b>3</b>	<b>20</b>
<b>UNIT 4 - CO4: To know the nutritional value of foods, balanced diet.</b>					<b>4</b>	<b>15</b>
<b>UNIT 5- CO5: To describe the deficiency diseases.</b>					<b>5</b>	<b>10</b>
<b>SYLLABUS</b>						
<b>UNIT I: Introduction and scope. Carbohydrates, proteins and lipids - sources - daily requirements - essential amino acids- essential fatty acids.</b>						
<b>UNIT II: Vitamins and minerals – types - sources and functions-deficiency symptoms and treatment. Prevention and treatment. Water as a nutrient- regulation of water balance.</b>						
<b>UNIT III: Calorific values of food - Basal Metabolic Rate - BMI-Energy requirements of man, pregnant women, infants and children. Nutritional requirements-infants, school children, pregnant and lactating mothers and the aged- health education-malnutrition.</b>						
<b>UNIT 1V: Nutritional value of foods, cereals, fruits, milk, egg, meat, and fish. Balanced diet.</b>						

**UNIT V: Deficiency diseases - anemia, osteoporosis, kwashiorkor and marasmus.**

**TEXT BOOKS:**

1. Sri Lakshmi B. Human Nutrition. New age International Pub., 2009

**REFERENCES:**

1. Gopalan CB, Ramasastri S and Balasubramanian SC. Nutritive Value of Indian Foods. National Institute of Nutrition, Hyderabad, 1971
2. Pandey MD and Kulkurni N. Food and Nutrition. Himalaya Pub., 2010
3. Sri Lakshmi B. Food science. New age International Pub.,2012

Course Designer: P. Yuvarani

**Course content and Lecture Schedule**

<b>UNITS</b>	<b>TOPIC</b>	<b>LECTURE HOURS</b>	<b>MODE OF TEACHING</b>
<b>UNIT I</b>			
1.1	Introduction and scope Carbohydrates, protein and lipids	5	Lecture – 3, Chart – 2
1.2	Sources - Daily requirements	5	Lecture- 3, charts-2
1.3	Essential amino acids	3	Models- 1 charts- 1,Lecture – 1
1.4	Essential fatty acids.	2	Models- 1, charts- 1
<b>UNIT II</b>			
2.1	Vitamins	4	Charts – 2, Lecture – 2
2.2	Minerals	4	Charts – 2, Lecture – 2
2.3	Water as a nutrient	4	Charts – 2, Lecture – 2
2.4	Regulation of water balance.	3	Charts – 1, Lecture – 2
<b>UNIT III</b>			
3.1	Calorific values of food	3	Chart – 1 , Lecture – 2
3.2	Basal Metabolic Rate,BMI	4	Chart – 2 , Lecture – 2
3.3	Energy requirements	4	Chart – 2 , Lecture – 2
3.4	Nutritional requirements	4	Chart – 2 , Lecture – 2

3.5	Health education	3	Chart – 1 , Lecture – 2
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3.6	Malnutrition.	2	Visual aids-1, Lecture – 1
<b>UNIT IV</b>			
4.1	Nutritional value of foods	10	Chart- 2, Lecture – 6, Visual aids 2
4.2	Balanced diet.	5	Chart -2, Lecture – 3
<b>UNIT V</b>			
5.1	Deficiency diseases - Anemia	3	Chart-1, Lecture- 2
5.2	Osteoporosis	3	Chart-1, Lecture- 2
5.3	Kwashiorkor	2	Chart -1 , Lecture -1
5.4	Marasmus	2	Visual aids-1 , Lecture – 1

Course Outcomes (Cos)	Programme Outcomes (Pos)							Programme Specific Outcomes (PSOs)							Mean scores of Cos
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PS O1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	
CO1	3	4	3	3	5	3	3	2	4	4	3	3	3	3	3.24
CO2	4	4	4	3	3	3	4	4	3	3	3	3	4	4	3.57
CO3	3	3	3	3	4	4	3	3	4	3	4	4	4	3	3.50
CO4	3	3	3	3	3	4	4	4	4	4	3	4	4	4	3.57
CO5	4	4	4	4	3	3	3	3	3	3	4	4	4	4	3.50
<b>Mean Overall Score</b>														<b>3.47</b>	

**Result: The Score for this Course is 3.47 (High Relationship)**

<b>Mapping</b>	<b>1-20%</b>	<b>21-40%</b>	<b>41-60%</b>	<b>61-80%</b>	<b>81-100%</b>
<b>Scale</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Relation</b>	<b>0.0-1.0</b>	<b>1.1-2.0</b>	<b>2.1-3.0</b>	<b>3.1-4.0</b>	<b>4.1-5.0</b>
<b>Quality</b>	<b>Very Poor</b>	<b>Poor</b>	<b>Moderate</b>	<b>High</b>	<b>Very High</b>

Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos \& PSOs}}$	Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$
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<b>BLOOM'S</b>	<b>INTERNAL</b>	<b>EXTERNAL</b>
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<b>TAXANOMY</b>		
<b>KNOWLEDGE</b>	<b>50%</b>	<b>50%</b>
<b>UNDERSTANDING</b>	<b>30%</b>	<b>30%</b>
<b>APPLY</b>	<b>20%</b>	<b>20%</b>

**Programme : B.Sc**  
**Semester : VI**  
**Sub.Code : EZ52**

**Part III: Elective 2**  
**Hours: 5P/W Hrs. 75 P/S**  
**Credits: 5**

**TITLE OF THE PAPER: ECONOMIC ZOOLOGY**

<b>Pedagogy</b>	<b>Hours</b>	<b>Lecture</b>	<b>Peer teaching</b>	<b>GD/VIDEOS/TUTORIAL</b>	<b>ICT</b>
	<b>5</b>	<b>1</b>		<b>2</b>	<b>2</b>

**PREAMBLE:**

**The impact of insects in human as well as others life, practice of Agro based industries an awareness on harmful effects of vectors and various control measures are dealt here**

<b>COURSE OUTCOME</b>	<b>Unit</b>	<b>Hrs P/S</b>
<b>At the end of the Semester, the Students will be able to</b>		
<b>UNIT 1- CO1:Understand the importance of beneficial insects like Honey bee,Silk worm and Lac insect and practice to rear them in their fields.</b>	<b>1</b>	<b>20</b>
<b>UNIT2- CO2:Identify the harmful insects of human and crops and learn how to control them.</b>	<b>2</b>	<b>15</b>
<b>UNIT3-CO3: Learn the basic principles involved in the culture and breeding of Dairy animals.</b>	<b>3</b>	<b>15</b>
<b>UNIT4- CO4: Learn the basic principles involved in the culture and breeding of Poultry.</b>	<b>4</b>	<b>10</b>
<b>UNIT5 -CO5: Understand the importance of fishery industry</b>	<b>5</b>	<b>15</b>

**SYLLABUS**

**UNIT I:**

**Beneficial insects- Silk worm- life cycle, types of silk, silk production in India. Honey bee - social organization, chemical composition of honey, value of honey, bee wax and bee venom. Bee keeping in India, Lac insect cultivation - harvesting, processing,**

composition, uses and properties. Lac Industry in India.

**UNIT II:**

Harmful insects – mosquito (*Aedes aegypti*, *Culex quinquefasciatus*, *Anopheles stephensi*) housefly, head louse - harmful effects and any five control measures. Agricultural pests - damages and control measures of sugarcane shoot borer, paddy - *Nilaparvathalugens*, cereals - *Tribolium castaneum*, Coconut - *Oryctus rhinoceros*, Cotton - *Earias vitella*.

**UNIT III:**

Dairy industry - two breeds of dairy animals - Cow-Sindhi and Jersey-Buffalo - Murrah and Jaffarabadi, Feeding stuffs, any three diseases of dairy animals (anthrax, calf pneumonia and mastitis). Milk and milk products.

**UNIT IV:**

Poultry industry- indigenous breeds- Aseel and Chittagong, exotic breeds- Leghorn and Rhode island red, food and feed formula. Diseases of poultry- Ranikhet, fowl pox, fowl cholera. Poultry products - egg, poultry meat and poultry manure.

**UNIT V:**

Fishery industry - edible fishes - *Catla*, *Rohu*, *Tilapia* and *Chanos*, Economic importance of fishes. Ornamental fishes - Goldfish, Angel fish, Fighter fish, Gourami fish, Guppy, Molly, Mosquito fish, Paradise fish, Tiger barb, Zebra fish - significance

**Text book:**

1. Manju Yadav. Economic zoology. Discovery Pub., 2003

**Reference Books:**

1. Gnanamani MR. Modern Aspects of Poultry keeping .Deepam Pub., 2010
2. Malhotra P. Economic zoology. Adhyayan Pub., 2008
3. Sinha RK. Hand book of Fish and Fisheries. Agrotech Press, 2014

Course designer: Mrs .A.Sheela

**Course contents and lecture schedule**

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
<b>UNIT 1</b>			
1.1	Sericulture	10	Lecture -- 5, Video/ Field visit-5
1.2	Apiculture	5	Lecture – 3, Video/ Field visit-2
1.3	Lac culture	5	Lecture – 3, Video-2
<b>UNIT 2</b>			
2.1	Harmful insects - mosquito, housefly, head louse - harmful effects and any	5	Lecture – 3, Video-2

	five control measures		
2.2	Damages and control measures of sugarcane shoot borer, paddy - <i>Nilaparvathalugens</i> ,	5	Lecture – 3, ICT-2
2.3	Cereals - <i>Triboliumcastaneum</i> , Coconut - <i>Oryctusrhinoceroes</i> , Cotton- <i>Eariasvitella</i> .	5	Lecture – 3,Video-2
<b>UNIT 3</b>			
3.1	Two breeds of dairy animals - Cow-Sindhi and Jersey-Buffalo - Murrah and Jaffarabadi,	5	Lecture – 3,Video-2
3.2	Feeding stuffs, any three diseases of dairy animals (anthrax, calf pneumonia and mastitis).	5	Lecture – 3, ICT-2
3.3	Milk and milk products.	5	Lecture - 3, Demo-2
<b>UNIT 4</b>			
4.1	Indigenous breeds- Aseel and Chittagong, exotic breeds- Leghorn and Rhode islandred, food and feed formula.	5	Lecture – 3, Video and photos-2
4.2	Diseases of poultry- Ranikhet, fowl pox, fowl cholera. Poultry products	3	Lecture – 2, ICT-1
4.3	Poultry products - egg, poultry meat and poultry manure.	2	Lecture - 1, Demo-1
<b>UNIT 5</b>			
5.1	Fishery Industry – edible fishes	5	Lecture - 3, Demo - 2
5.2	Economic importance of fishes	5	Lecture - 3, Demo- 2
5.3	Ornamental fishes	5	Lecture - 3, Demo - 2

Course Outcomes (Cos)	Programme outcomes (POs)					Programme specific outcomes (PSOs)							Mean Scores Of Cos
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	
CO 1	4	2	4	3	4	2	2	2	3	3	3	4	3.0
CO 2	4	2	3	3	4	3	2	2	3	3	4	4	3.08
CO 3	4	3	3	3	4	2	2	2	2	3	4	3	3.08
CO 4	4	3	3	3	4	3	2	2	3	3	4	4	3.16
CO 5	4	3	3	3	4	3	2	2	2	3	4	4	3.08
Mean overall score												3.08	

Result: The score for this course is 3.08 (High relationship)

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0

Quality	Very Poor	Poor	Moderate	High	Very High
Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos \& PSOs}}$			Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$		

BLOOM'S TAXANOMY	INTERNAL	EXTERNAL
KNOWLEDGE	50%	50%
UNDERSTANDING	30%	30%
APPLY	20%	20%

Programme : UG ZOOLOGY  
Semester : VI  
Sub.Code : EZ63

Part III: Elective3  
Hours: 5P/W 75Hrs P/S  
Credits: 5

### TITLE OF THE PAPER: ELECTIVE 3 - FISHERY BIOLOGY

Pedagogy	Hours	Lecture	Peer teaching	GD/VIDEOS/TUTORIAL	ICT
	5	2	1	1	1

#### PREAMBLE

The students will understand the nutritional and medicinal values of fishes and to gain knowledge about fisheries towards entrepreneurship.

COURSE OUTCOME	Unit	Hrs P/S
At the end of the Semester, the Students will be able to		
<b>UNIT 1 CO1:</b> Acquire the knowledge about the classification of fishes and marine environment	1	15
<b>UNIT2 CO2:</b> Understand the feeding biology of the fish and spawning	2	15
<b>UNIT3 CO3:</b> Acquires the knowledge of fish culture techniques	3	15
<b>UNIT4 CO4:</b> Learn the importance of Shellfish culture and identify various perspectives of applied branches of Zoology for the possibilities of self employment	4	15



<b>UNIT 5 CO5:</b> Acquires the knowledge of fishing crafts and gears, and fish processing	5	15
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## **SYLLABUS**

**UNIT I: Scope of Fishery-classification of fisheries- capture fisheries-Exclusive Economic Zone (EEZ) - Marine, coastal, offshore and deep sea- crustacean- shrimp, lobster, crab.**

**UNIT II: Feeding biology of fish - food and feeding habits of fishes - air bladder in fishes- reproduction in fishes-induced spawning in carps- ecological factors influencing spawning in carps.**

**UNIT III: Culture fisheries - site selection - construction of ponds - kinds of fish culture - monoculture, paddy cum fish culture, sewage fed fish culture - Integrated fish farming.**

**UNIT IV: Shellfish culture - culture of prawn, crab, edible oyster. Natural pearl formation, artificial pearl culture - maintenance of home aquarium - pen culture .**

**UNIT V: Fishing craft and gears in India - Parasites and diseases of fishes - Fish processing and preservation. Canning of fishes - fish in relation to public health.**

**.Text book:**

1. Santhana Kumar G and Selva Raj A. concepts of Aqua Culture. Meenam Pub., 2005

**Reference books:**

1. Gupta SM. Text book of Fishery. Anne Books Pvt. Ltd., 2010
2. Jhingram VG. Fish and Fisheries of India, Hindustan Pub., 1982
3. Sinha RK. Hand book of Fish and Fisheries. Agrotech Press, 2014

**Course Designer: Mrs. N. AMUTHA**

### **Course Content and Lecture Schedule**

<b>UNITS</b>	<b>TOPIC</b>	<b>LECTURE HOURS</b>	<b>MODE OF TEACHING</b>
<b>UNIT 1</b>			
	<b>Classification of fisheries</b>	5	Chart - 2 Lecture-3
	<b>Exclusive Economic Zone (EEZ) - Marine, coastal, offshore and deep sea</b>	5	Lecture -3 video demonstration -2

	Crustacean fishery- shrimp, lobster, crab.	5	Lecture -3 video demonstration -2
<b>UNIT 2</b>			
	Feeding biology of fish	5	Lecture -3 video demonstration -2
	Air bladder in fishes - reproduction in fishes	5	Lecture -3 video demonstration -2
	Induced spawning in carps	5	Lecture -3 video demonstration -2
<b>UNIT 3</b>			
	Culture fisheries- site selection- construction of ponds	5	Lecture-5
	Kinds of fish culture - monoculture, paddy cum fish culture, sewage fed fish culture - Integrated fish farming	5	Lecture-3 ICT - 2
	Integrated fish farming.	5	Lecture -3 video demonstration -2
<b>UNIT 4</b>			
	Shellfish culture - culture of prawn, crab, edible oyster..	5	Lecture-3 ICT - 2
	Natural pearl formation, artificial pearl culture	5	Lecture-3 ICT - 2
	Maintenance of home aquarium - pen culture	5	Lecture-3 ICT - 2
<b>UNIT 5</b>			
	Fishing craft and gears	5	Lecture -3 video demonstration -2
	Diseases of fishes	5	Lecture
	Fish processing and preservation	5	Lecture -3 video demonstration -2

Course Outcomes (Cos)	Programme outcomes (POs)					Programme specific outcomes (PSOs)							Mean Scores of COs	
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7		
CO 1	4	3	3	3	2	4	3	3	3	3	3	3	3	3.08
CO 2	3	4	2	3	4	4	3	3	3	3	3	3	3	3.16
CO 3	4	3	3	3	3	3	3	3	3	3	3	3	3	3.08
CO 4	4	4	4	4	4	4	3	3	2	3	4	4	4	3.33

CO 5	2	3	3	3	4	3	2	3	4	3	2	4	3.0
Mean overall score													3.13

Result: The score for this course is 3.13 (High relationship)

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High
Mean Score of COs = PSOs	<u>Total of Value</u> Total No. of Pos &		Mean Overall Score of COs = <u>Total of Mean Score</u> Total No. of COs		

BLOOM'S TAXANOMY	INTERNAL	EXTERNAL
KNOWLEDGE	50%	50%
UNDERSTANDING	30%	30%
APPLY	20%	20%

Programme : B.Sc., ZOOLOGY  
Semester : III  
Sub. Code : SZ31

Part IV: Skill Based Elective1  
Hours : 2 P/W 30 Hrs P/S  
Credits : 2

**TITLE OF THE PAPER: BIOINSTRUMENTATION AND BIOTECHNIQUES**

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDOES/TUTORIAL	ICT	
	2	1	--	--	1	
<b>PREAMBLE: To gain knowledge about the principles and applications of basic scientific instruments,</b>						
<b>To find placement in scientific companies</b>						
<b>COURSE OUTCOME</b>					<b>Unit</b>	<b>Hrs P/S</b>
<b>At the end of the Semester, the Students will be able to</b>						
<b>UNIT 1 CO1: Describe the general principles and uses of different kinds of microscope.</b>					<b>1</b>	<b>6</b>
<b>UNIT 2 CO2: Analyse the mechanism of chromatography and pH meter based on solvents.</b>					<b>2</b>	<b>6</b>
<b>UNIT 3 CO3: Interpret the applications of biomedical instruments such as E.C.G.,E.E.G, C.T., and M.R.I.</b>					<b>3</b>	<b>5</b>
<b>UNIT 4 CO4: Apply the theoretical aspects of calorimeter and spectrophotometer based on collection of samples.</b>					<b>4</b>	<b>6</b>
<b>UNIT 5 CO5: Understand the principles of DNA sequences and blotting</b>					<b>5</b>	<b>7</b>

techniques.		
<b>SYLLABUS</b>		
<b>UNIT I: Microscopy - Principles and applications of compound and phase contrast microscope Types of electron microscope – scanning and transmission</b>		
<b>UNIT II: Chromatography - Principles and applications of paper, thin layer and ion exchange Chromatography. Principles and applications of pH meter</b>		
<b>UNIT III: Biomedical Instruments - Principles and applications of centrifuge - Clinical and ultra Centrifuge. Principles and applications of ECG , EEG, CT, MRI</b>		
<b>UNIT IV: Principles and applications of Colori meter and spectro photo meter. Principles and applications of Nuclear Magnetic Resonance Spectroscopy and Atomic Absorption Spectroscopy.</b>		
<b>UNIT V: Blotting Techniques - Principles and applications of Northern, Southern and Western. DNA Sequencing Techniques – Sanger and Gil hert method</b>		
<b>TEXT BOOKS: 1. Kumaresan V . Principles and Techniques of Biophysics. Saras Pub ., 2012</b>		
<b>REFERENCES:</b>		
1. Jayaraman J. Laboratory Manual in Biochemistry. Wiley Pub., 2005		
2. Subramanian MA. Biophysics – Principles and Techniques. MJP Pub., 2008		

Course Designer: Dr.E. Emimal Victoria

### Course Content and Lecture Schedule

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
<b>UNIT 1</b>			
1.1	<b>Principles and applications of compound and phase contrast microscope</b>	3	Lecture - 2 ICT - 1
1.2	<b>Types of electron microscope – scanning and transmission</b>	3	Lecture - 2 ICT - 1
<b>UNIT 11</b>			
1.1	<b>Principles and applications of paper, thin layer</b>	4	Lecture – 3 ICT - 1

and ion exchange chromatography		
1.2 : Principles and applications of pH meter	2	Lecture - 2
<b>UNIT III</b>		
1.1 : Principles and applications of centrifuge	2	Lecture
1.2 : Clinical and ultra centrifuge	1	ICT - 1
1.2 : Principles and applications of ECG , EEG, CT, MRI	3	Lecture - 2 ICT - 1
<b>UNIT IV</b>		
1.1 : Principles and applications of Colorimeter and spectro photo meter	3	Lecture - 2 ICT - 1
1.2 : Principles and applications of Nuclear Magnetic Resonance Spectroscopy and Atomic Absorption Spectroscopy	3	Lecture - 2 ICT - 1
<b>UNIT V</b>		
1.1 : Principles and applications of Northern, Southern and Western Blotting techniques	3	Lecture - 2 ICT - 1
1.2 : DNA Sequencing Techniques – Sanger and Gilbert method	3	Lecture - 2 ICT - 1

Course Outcomes (Cos)	Programme Outcomes (Pos)					Programme Specific Outcomes (PSOs)							Mean scores of Cos
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	
CO1	3.5	2	4	4	2.5	2	3.5	4	3.5	4	4	2	3.3
CO2	2	3	4	4	4	2	2	3.5	2	4	4	2.5	3.1
CO3	3.5	2	4	4	4.5	2	3	4	2	3	4	3	3.3
CO4	4	2	4	3	3	2	2	4	3	4	4	2	3.1
CO5	4	2.5	4	4	3.5	2	3	4	4	4	4	3	3.6
<b>Mean Overall Score</b>													<b>3.28</b>

**Result: The Score for this Course is 3.28 (High Relationship)**

<b>Mapping</b>	<b>1-20%</b>	<b>21-40%</b>	<b>41-60%</b>	<b>61-80%</b>	<b>81-100%</b>
<b>Scale</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Relation</b>	<b>0.0-1.0</b>	<b>1.1-2.0</b>	<b>2.1-3.0</b>	<b>3.1-4.0</b>	<b>4.1-5.0</b>
<b>Quality</b>	<b>Very Poor</b>	<b>Poor</b>	<b>Moderate</b>	<b>High</b>	<b>Very High</b>
<b>Mean Score of COs = <math>\frac{\text{Total of Value}}{\text{Total No. of Pos \&amp; PSOs}}</math></b>			<b>Mean Overall Score of COs = <math>\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}</math></b>		

<b>BLOOM'S TAXANOMY</b>	<b>INTERNAL</b>	<b>EXTERNAL</b>
<b>KNOWLEDGE</b>	<b>50%</b>	<b>50%</b>
<b>UNDERSTANDING</b>	<b>30%</b>	<b>30%</b>
<b>APPLY</b>	<b>20%</b>	<b>20%</b>

**Programme : B.Sc**  
**Semester : III & IV**  
**Sub.Code : SZ42**

**Part III: SKILLBASED ELECTIVE 2**  
**Hours :2 P/W Hrs 30 P/S**  
**Credits:2**

**TITLE OF THE PAPER:SBE 2: VERMICULTURE AND VERMICOMPOSTING**

<b>Pedagogy</b>	<b>Hours</b>	<b>Lecture</b>	<b>Peer teaching</b>	<b>GD/VIDEOS/TUTORIAL</b>	<b>ICT</b>
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	2	1	-	-	1
<b>PREAMBLE :</b>					
The course will provide knowledge about the preparation of vermi compost applied in organic agriculture and create entrepreneurship opportunities					

<b>COURSE OUTCOME</b>	<b>Unit</b>	<b>Hrs P/S</b>
At the end of the Semester, the Students will be able to		
<b>UNIT 1 CO1: Be capable to understand the basic taxonomy and classification of earthworms</b>	<b>1</b>	<b>6</b>
<b>UNIT 2 CO2: Acquire knowledge and skills in the establishment and production of Vermi compost</b>	<b>2</b>	<b>6</b>
<b>UNIT 3 CO3: Understand the concepts and techniques of vermi composting</b>	<b>3</b>	<b>6</b>
<b>UNIT 4 CO4: Promote Vermi composting as a treatment practice from organic waste</b>	<b>4</b>	<b>6</b>
<b>UNIT 5 CO5: Gain knowledge and skills on vermi culture, composting and enterprise</b>	<b>5</b>	<b>6</b>

#### **SYLLABUS**

##### **UNIT I:**

Earthworms - Taxonomic position and diversity; characteristics, Type Study: epigeic species – *Eudrilus eugeniae*, endogeic species – *Polypheretima elongata* and anecic species – *Lampito mauritii*.

##### **UNIT II:**

Vermiculture and vermicomposting - definition, scope, importance, organic waste sources. Requirements of vermiculture - choice of species, composting species, species for solid waste management and environmental requirements in vermicomposting. Role of microbes in vermicomposting.

##### **UNIT III:**

Culture methods - small scale and large scale - pit method, heap method and windrow method - wormery. Factors affecting vermicomposting - pH, moisture, temperature, nutritional value of feed.

##### **UNIT IV:**

Applications of vermiculture- agricultural and horticultural practices - organic farming, biofertilizers, vermicast and vermiwash.

**UNIT V:**

Applications of vermiculture in pollution abatement - Economics of vermiculture. Expenditure, profit, cost benefit analysis.

**Text Book:**

1. Seethalakshmi M and Santhi R. Text book of Vermitechnology. Saras Pub., 2012

**Reference Books:**

1. Christy AM. Text book of Vermi technology. MJP Pub., 2008
2. Ismail SA. The Earthworm. 2<sup>nd</sup>Edn., Other India Press, Goa, India

Course Designer : Dr. C.Rani Vijaya

**COURSE CONTENT AND LECTURE SHEDULE**

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
<b>UNIT 1</b>			
	Earthworm-Taxonomic position and diversity; characteristics	2	Lecture -1, PPT1
	Types - epigeic species,	2	Lecture -1,ICT-1
	Endogeic species and Anecic species	2	Lecture -1, video demonstration - 1
<b>UNIT 2</b>			
	Vermiculture and Vermicomposting - definition, scope, importance, organic waste sources	2	Lecture - 2
	Requirements of Vermiculture- choice of species, composting species, species for solid waste management	2	Lecture -1, video demonstration-1
	Environmental requirements in vermicomposting.	1	Lecture -1,
	Role of microbes in Vermicomposting.	1	ICT-1
<b>UNIT 3</b>			
	Culture methods - small scale and large scale	2	Lecture-1, ICT - 1
	Pit method, heap method and windrow method - wormery.	2	Lecture-1, Group activity-1
	Nutritional value of feed	1	ICT- 1
	Environmental requirements in vermicomposting.	1	PPT -1
<b>UNIT 4</b>			
	Applications of vermiculture-	2	Lecture-1, ICT-1



	<b>agricultural and horticultural practices</b>		
	<b>Organic farming, Biofertilizers,</b>	<b>2</b>	<b>ICT-2</b>
	<b>Vermicast</b>	<b>1</b>	<b>Lecture-1</b>
	<b>Vermiwash</b>	<b>1</b>	<b>Demonstration-1</b>
<b>UNIT 5</b>			
	<b>Applications of vermiculture in pollution abatement</b>	<b>2</b>	<b>Lecture-2</b>
	<b>Economics of vermiculture</b>	<b>2</b>	<b>Lecture-2</b>
	<b>Expenditure, profit, cost benefit analysis</b>	<b>2</b>	<b>Lecture-1, PPT-1</b>

Course Outcomes (Cos)	Programme outcomes (POs)					Programme specific outcomes (PSOs)							Mean Scores Of Cos
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	
CO 1	4	3	4	3	4	3	2	3	3	3	3	4	3.2
CO 2	4	2	3	3	4	3	3	4	3	3	4	4	3.3
CO 3	4	3	3	3	4	3	3	3	2	3	4	3	3.1
CO 4	4	3	3	3	4	3	3	3	3	3	4	4	3.3
CO 5	4	3	3	3	4	3	3	3	4	3	4	4	3.4
<b>Mean overall score</b>												<b>3.26</b>	

Result: The score for this course is **3.26** (High relationship)

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High

<b>Mean Score of COs = <math>\frac{\text{Total of Value}}{\text{Total No. of Pos \&amp; PSOs}}</math></b>	<b>Mean Overall Score of COs = <math>\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}</math></b>
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BLOOM'S TAXANOMY	INTERNAL	EXTERNAL
<b>KNOWLEDGE</b>	<b>50%</b>	<b>50%</b>
<b>UNDERSTANDING</b>	<b>30%</b>	<b>30%</b>
<b>APPLY</b>	<b>20%</b>	<b>20%</b>

**Programme: B.Sc., ZOOLOGY**  
**Semester : IV**  
**Sub. Code : SZ43**

**Part III: SKILLBASED ELECTIVE 3**  
**Hours: 2P/W Hrs 30 P/S**  
**Credits: 2**

## TITLE OF THE PAPER: MEDICAL BIOLOGY

Pedagogy	Hours	Lecture	Peer teaching	GD/VIDEOS/TUTORIAL	ICT
	2	1	-	-	1

### PREAMBLE

The students will be introduced to basic laboratory diagnostic techniques with a view to gain job opportunities in hospitals, clinical labs and healthcare centres and also for self employment

COURSE OUTCOME	Unit	Hrs P/S
At the end of the Semester, the Students will be able to		
<b>UNIT 1 CO1:</b> Understand the bacterial and viral diseases	1	7
<b>UNIT 2 CO2:</b> Learn parasitic and fungal diseases	2	7
<b>UNIT 3 CO3:</b> Understand the Nosocomial and occupational pathogens	3	3
<b>UNIT 4 CO4:</b> Learn blood cell counting, blood sugar and haemoglobin estimation	4	7
<b>UNIT 5 CO5:</b> Learn creatinine and urea estimation in blood and urine	5	6

### SYLLABUS

**UNIT I: Bacterial diseases - Tuberculosis, Leptospirosis. Viral diseases - Hepatitis, AIDS.**

**UNIT II: Parasitic diseases - Malaria, Taeniasis, Filaria. Fungal diseases - Candidiasis, Aflatoxicosis.**

**UNIT III: Nosocomial and occupational pathogens – *Pseudomonas*, *Streptococcus* and *Staphylococcus*. Safety and control measures.**

**UNIT IV: Total count - RBC, WBC, differential count, haemoglobin estimation, ESR, BT and CT, blood sugar - random, PP and GTT.**

**UNIT V: Blood urea, blood creatinine. Urine – urea and creatinine. Presence of pus cells and albumin.**

**Text Books:**

1. Dubey RC and Maheswari DK. A Text Book of Microbiology. S. Chand and Company Ltd., New Delhi, 2005
2. Jayaraman J. Laboratory Manual in Biochemistry. New Age International Pub., 2006

**Reference Books:**

1. Dubey RC and Maheswari DK. Practical Microbiology. S. Chand and Company, New Delhi, 2008
2. Kannan N. Laboratory Manual in General Microbiology. Palani Paramount Pub., 1995
3. Wilson K and Walker J. Practical Biochemistry. Cambridge University Press, 1995

Course Designer : Mrs. N. AMUTHA

### Course Content and Lecture Schedule

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
<b>UNIT 1</b>			
	<b>Bacterial diseases - Tuberculosis, Leptospirosis.</b>	2	Lecture -1 video demonstration -1
	<b>Viral diseases - Hepatitis</b>	3	Lecture -2 video demonstration -1
	<b>AIDS.</b>	2	Lecture -1 video demonstration -1
<b>UNIT 2</b>			
	<b>Malaria</b>	3	Lecture-2 ICT -1
	<b>Taeniasis, Filariasis.</b>	2	Lecture -1 ICT -1
	<b>Candidiasis, Aflatoxicosis.</b>	2	Lecture -1 ICT- 1
<b>UNIT 3</b>			
	<b>Pseudomonas</b>	1	Lecture
	<b>Streptococcus</b>	1	Lecture
	<b>Staphylococcus.</b>	1	Lecture
<b>UNIT 4</b>			
	<b>Total count - RBC, WBC, differential count</b>	2	Lecture -1 ICT -1
	<b>Haemoglobin estimation, ESR, BT and CT</b>	2	Lecture -1 ICT -1
	<b>Blood sugar - random, PP and GTT.</b>	3	Lecture -2 ICT -1
<b>UNIT 5</b>			
	<b>Blood urea, blood creatinine</b>	2	Lecture -1 ICT -1
	<b>Urine – urea and creatinine</b>	2	Lecture -1 ICT -1

	Presence of pus cells and albumin.	2	Lecture -1 ICT -1
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Course Outcomes (Cos)	Programme outcomes (POs)					Programme specific outcomes (PSOs)							Mean Scores Of Cos
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	
CO 1	4	2	4	3	4	2	2	2	3	3	3	4	3.0
CO 2	4	2	3	3	4	3	2	2	3	3	4	4	3.08
CO 3	4	3	3	3	4	2	2	2	2	3	4	3	3.08
CO 4	4	3	3	3	4	3	2	2	3	3	4	4	3.16
CO 5	4	3	3	3	4	3	2	2	2	3	4	4	3.08
Mean overall score													3.08

**Result: The score for this course is 3.08 (High relationship)**

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High
Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos \& PSOs}}$			Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$		

BLOOM'S TAXANOMY	INTERNAL	EXTERNAL
KNOWLEDGE	50%	50%
UNDERSTANDING	30%	30%
APPLY	20%	20%

Programme : B.Sc  
Semester : V and VI

Skill based elective 5  
Hours : 2P/W/S ; 60 Hrs

Course Code :SZ65

Credits :2

**TITLE OF THE PAPER: BIOINFORMATICS**

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDEOS/TUTORIAL	ICT	
	2	1	-	-	1	
<b>PREAMBLE:</b> The course will introduce basic principles of Bioinformatics and its applications in various disciplines of Biology.						
<b>COURSE OUTCOME</b>					<b>Unit</b>	<b>Hrs P/S</b>
<b>At the end of the Semester, the Students will be able to</b>						
<b>UNIT 1 - CO1: expose themselves to the emerging field of Bioinformatics</b>					<b>1</b>	<b>6</b>
<b>UNIT 2- CO2: acquire knowledge about types of biological databases</b>					<b>2</b>	<b>14</b>
<b>UNIT 3 - CO3: use data retrieval techniques and analyse database similarity search tools and phylogenetic studies</b>					<b>3</b>	<b>16</b>
<b>UNIT 4 - CO4: understand prediction of structure and function of proteins and visualization</b>					<b>4</b>	<b>12</b>
<b>UNIT 5 - CO5: enrich knowledge about computational drug designing methods</b>					<b>5</b>	<b>12</b>

**SYLLABUS**

**Unit I:** History and scope of bioinformatics. Bioinformatics and internet. Useful bioinformatics sites., Applications of Bioinformatics.

**Unit II:** Biological databases- classification- Nucleotide sequence databases - protein sequence databases- organism specific databases.-miscellaneous databases.

**Unit III:** Data retrieval- retrieving tools –Entrez and SRS., Sequence Analysis tools – BLAST and FASTA. Sequence alignment- simple and multiple sequence alignment – local and global alignment- CLUSTAL.W . Phylogenetic studies-phylogenetic trees-PHYLIP.

**Unit IV:** Prediction of structure and function of proteins-Structure prediction tools and softwares- homology modelling - Visualisation tools-RASWIN, Swiss PDB viewer.

**Unit V:** Computer Aided Drug Designing- target-lead-Structure based and ligand based designing- -

Application of Bioinformatics in drug discovery Docking (definition only).

**TEXT BOOK:**

1. Mani K and Vijayraj N. Bioinformatics for beginners. Kalaikathir Achagam, 2004

**REFERENCE BOOKS:**

1. Bergeron B. Bioinformatics Computing. Prentice Hall India, EE Edn., 2006
2. Bosu O and Thukral SK. Bioinformatics-Databases, Tools and Algorithms. Oxford University Press, 2009
3. Westhed and Twyman K. Bioinformatics. Viva books Ltd., 2006.

**Course designer: Dr. V. Kabila**

**Course contents and lecture schedule**

UNITS	TOPIC	LECTURE HRS.	MODE OF TEACHING
<b>UNIT I</b>			
1.1	History and scope of bioinformatics. Bioinformatics as interdisciplinary science.	3	Lecture-2 ICT-1
1.2	Bioinformatics and internet-.Useful bioinformatics sites. Applications of Bioinformatics	3	L-1 ICT-2
<b>UNIT II</b>			
2.1	Biological databases- definition classification	4	Lecture-3 ICT-1
2.2	Nucleotide sequence databases - examples- protein sequence databases- examples	7	Lecture-3 ICT-4
2.3	organism specific databases.- examples; miscellaneous databases	3	Lecture-2 ICT-1
<b>UNIT- III</b>			
3.1	Data retrieval- retrieving tools –Entrez & SRS.,	4	Lecture-1 ICT-3
3.2	Sequence Analysis tools – BLAST and FASTA.	4	Lecture-1 ICT-3
3.3	Sequence alignment- simple and multiple sequence alignment –local and global alignment- CLUSTAL W	4	Lecture-1 ICT-3
3.4	Phylogenetic studies-phylogenetic trees – PHYLIP	4	Lecture-1 ICT-3
<b>UNIT IV</b>			
4.1	Prediction of structure and function of proteins-Structure prediction tools and softwares	7	Lecture-3 ICT-4

4.2	homology modelling - Visualisation tools-RASWIN, Swiss PDB viewer	5	Lecture-2 ICT-3
<b>UNIT V</b>			
5.1	Computer Aided Drug Designing- target-lead-Structure based and ligand based drug designing	7	Lecture-5 ICT-2
5.2	Application of Bioinformatics in drug discovery Docking (definition only).	5	Lecture-3 ICT-2

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)							Mean scores of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	
CO1	3.4	3.5	3.7	3.0	3.2	3.2	3.4	3.3	3.7	3.6	3.6	3.7	3.44
CO2	3.4	3.6	3.5	3.2	3.0	3.0	3.4	3.3	3.3	3.7	3.5	3.6	3.37
CO3	3.2	3.6	3.3	3.3	3.2	3.8	3.2	3.0	4.0	3.6	3.2	3.9	3.44
CO4	3.3	3.6	3.2	3.1	3.1	3.0	3.7	3.4	3.9	3.7	3.4	3.5	3.40
CO5	3.4	2.5	3.7	3.0	3.4	3.2	3.8	3.3	4.2	3.5	3.5	3.0	3.37
<b>Mean Overall Score</b>												<b>3.40</b>	

**Result: The Score for this Course is 3.40 (High Relationship)**

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High
Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos \& PSOs}}$			Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$		

BLOOM'S TAXANOMY	INTERNAL	EXTERNAL
KNOWLEDGE	50%	50%
UNDERSTANDING	30%	30%
APPLY	20%	20%



Programme : B. Sc Zoology  
 Semester : VI  
 Sub. Code : SZ66

Part III: Skill Based  
 Hours : 2 P/W 30Hrs P/S  
 Credits: 2

**TITLE OF THE PAPER: ENTREPRENEURIAL DEVELOPMENT**

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDEOS/TUTORIAL	ICT	
	2	1		1		
<b>PREAMBLE:</b>						
<p>To develop entrepreneurship skill's among student            To motivate students to become successful entrepreneurs</p>						
<b>COURSE OUTCOME</b>					<b>Unit</b>	<b>Hrs P/S</b>
<b>At the end of the Semester, the Students will be able to</b>						
<b>UNIT 1- CO1:</b> Identify the Characters of Entrepreneurship					<b>1</b>	<b>5</b>
<b>UNIT 2- CO2:</b> To gain knowledge about the agencies promoting entrepreneurship					<b>2</b>	<b>5</b>
<b>UNIT 3 -CO3:</b> Analyse the problems faced by women entrepreneurs					<b>3</b>	<b>8</b>
<b>UNIT 4- CO4:</b> Describe the Business idea and opportunities					<b>4</b>	<b>6</b>
<b>UNIT 5 -CO5:</b> Explain the incentives and subsidies					<b>5</b>	<b>6</b>
<b>SYLLABUS</b>						
<b>UNIT I:</b> Define Entrepreneur, Characteristics of Entrepreneurship, Classification of Entrepreneur, Factors influencing Entrepreneurship						
<b>UNIT II:</b> Agencies promoting entrepreneurship/ EDP, KVIC, NIESBUD, SISI, SIPCOT, IDBI, NABARD, ICICI, Entrepreneurial Development in India- Commercial Banks- Public Banks						
<b>UNIT III:</b> Problems of Entrepreneur - Women Entrepreneurs – SHG - Rural Entrepreneurship-Small Scale Entrepreneur.						
<b>UNIT IV:</b> Business idea and opportunities- Marketing Feasibility-Product Strategies-Promotional Strategies.						

**UNIT V:**  
**Successful Entrepreneurs - Starting a Small Scale Industry- Bank Loan- Benefits of SSI- Incentives and Subsidies**

**TEXT BOOKS:**

**1.Jayashree Suresh : Entrepreneurial Development. 2<sup>nd</sup>Edn; Margham pub; 2008**

**REFERENCES:**

**1.Rengarajan L. Entrepreneurial Development; Sree Renga Pub; 2008**

Course designer :Dr.Kalaiarasi Roselind

**Course Contents and Lecture Schedule**

<b>UNITS</b>	<b>TOPIC</b>	<b>LECTURE HOURS</b>	<b>MODE OF TEACHING</b>
<b>UNIT I</b>			
<b>1.1</b>	<b>Characters of Entrepreneur</b>	<b>1</b>	<b>Group Discussion</b>
<b>1.2</b>	<b>Classification of Entrepreneur</b>	<b>2</b>	<b>Assignment with lecture</b>
<b>1.3</b>	<b>Factors influencing Entrepreneurship</b>	<b>2</b>	<b>Group Discussion</b>
<b>UNIT II</b>			
<b>2.1</b>	<b>Entrepreneurial Development in India</b>	<b>2</b>	<b>I C T-1 ,lecture-1</b>
<b>2.2</b>	<b>Commercial Banks</b>	<b>2</b>	<b>I C T-1, lecture-1</b>
<b>2.3</b>	<b>Public Banks</b>	<b>1</b>	<b>Group Discussion</b>
<b>UNIT III</b>			
<b>3.1</b>	<b>Problems of Entrepreneurs.</b>	<b>2</b>	<b>Assignment</b>
<b>3.2</b>	<b>Women Entrepreneurs</b>	<b>2</b>	<b>Group Discussion</b>
<b>3.3</b>	<b>Rural Entrepreneurship</b>	<b>2</b>	<b>I C T-1 lecture-1</b>
<b>3.4</b>	<b>Small Scale Entrepreneur.</b>	<b>2</b>	<b>I C T-1 lecture-1</b>
<b>UNIT IV</b>			
<b>4.1</b>	<b>Business idea and opportunities</b>	<b>2</b>	<b>I C T-1 lecture-1</b>
<b>4.2</b>	<b>Marketing Feasibility</b>	<b>2</b>	<b>Assignment-1,lecture-1</b>
<b>4.3</b>	<b>Product Strategies</b>	<b>1</b>	<b>Assignment-1</b>
<b>4.4</b>	<b>Promotional Strategies</b>	<b>1</b>	<b>Group Discussion-1</b>

4.5	Promotional Strategies	1	Group Discussion-1
<b>UNIT V</b>			
5.1	Successful Entrepreneurs	1	Group Discussion
5.2	Starting a small scale industry	2	I C T with lecture 2
5.3	Bank Loan	1	Lecture - 1
5.4	Benefits of SSI	1	Group Discussion
5.5	Incentives and Subsidies	1	Group Discussion

Course Outcomes (Cos)	Programme Outcomes (Pos)					Programme Specific Outcomes (PSOs)							Mean scores of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	
CO1	3	4	3	4	4	2	4	5	3	3	3	4	3.5
CO2	3	3	4	3	4	2	3	5	4	2	4	4	3.4
CO3	3	4	3	4	3	2	4	5	3	3	4	4	3.5
CO4	2	3	4	3	4	2	4	5	2	4	5	4	3.5
CO5	3	4	3	4	3	2	3	5	4	4	4	4	3.6
<b>Mean Overall Score</b>													<b>3.5</b>

**Result: The Score for this Course is 3.5 (High Relationship)**

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High
Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos \& PSOs}}$			Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$		

BLOOM'S TAXANOMY	INTERNAL	EXTERNAL
KNOWLEDGE	50%	50%
UNDERSTANDING	30%	30%
APPLY	20%	20%

Programme : B.Sc., Zoology  
 Semester : I  
 Sub. Code : AS1

Part III : First Allied Course  
 Hours : 4P/W 60Hrs P/S  
 Credits : 3

**TITLE OF THE PAPER: SERICULTURE I**

<b>Pedagogy</b>	<b>Hours</b>	<b>Lecture</b>	<b>Peer Teaching</b>	<b>GD/VIDOES/TUTORIAL</b>	<b>ICT</b>
	4	2	-		2

**PREAMBLE:**

This course will provide knowledge on the principles of moriculture and sericulture and understand the methods of sericulture.

<b>COURSE OUTCOME</b>	<b>Unit</b>	<b>Hrs P/S</b>
<b>At the end of the Semester, the Students will be able to</b>		
<b>UNIT 1 - CO1: describe the history of sericulture in India, know the role of central silk board.</b>	<b>1</b>	<b>8</b>
<b>UNIT 2 - CO2: explain planting systems , methods of Propagation and harvesting of leaves.</b>	<b>2</b>	<b>10</b>
<b>UNIT 3 - CO3: apply the knowledge of diseases of mulberry to develop entrepreneurship.</b>	<b>3</b>	<b>15</b>
<b>UNIT 4 - CO4: describe the morphology and life cycle of <i>Bombyxmori</i>, compare mulberry and non-mulberry silkworms.</b>	<b>4</b>	<b>15</b>
<b>UNIT 5 - CO5: classify silkworm races based moulting, voltinism, habitat and colour of cocoon, compare diapausing and non-diapausing eggs.</b>	<b>5</b>	<b>12</b>

**SYLLABUS**

**UNIT I:**

Introduction to sericulture - history of sericulture – sericulture industry in India – sericulture as cottage industry – role of Central Silk Board.

**UNIT II:**

Moriculture - varieties of mulberry – optimum conditions for mulberry growth – planting systems – methods of Propagation – harvesting of leaves.

**UNIT III:**

Diseases of mulberry -bacterial- Leaf blight disease - fungal - White root rot, Trunk rot and Powdery mildew - viral - Leaf mosaic disease - nematode disease - Root knot disease. Pests of

Mulberry - leaf eater -*Spilosoma*, Sap feeder - *Emposca*, stem borer - *Stheniasgrissator*.

**UNIT IV:**

Morphology of silkworms - mulberry and Non - mulberry silkworms - sexual dimorphism in larva, pupa and adult. Structure and function of silk gland – life cycle of *Bombyxmori*

**UNIT V:**

Classification of silkworm races - based on moulting, voltinism, habitat and colour of cocoon. Egg production - methods of industrial egg production -diapausing and non diapausing eggs.

**TEXT BOOK:**

1. Johnson M and Kesary M. Sericulture. 4<sup>th</sup>Edn., CSI Press., 2008

**REFERENCE BOOKS:**

1. Ganga G and SulochanaChetty J. An Introduction to Sericulture. 2<sup>nd</sup>Edn., Oxford and IBH Pub., New Delhi , 2004
2. Lakshmi Narasiah M and Jaya RajiG. Development of Sericulture. Discovery Pub. , New Delhi, 1999
3. Zing ZT and Maben. Mulberry Cultivation. Oxford and IBH Pub., New Delhi,1994

Course Designer: Dr. M. Kalaiarasi

**Course Contents and Lecture Schedule**

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
<b>UNIT 1</b>			
1.1	Introduction to sericulture history of sericulture	2	Lecture
1.2	Sericulture industry in India – sericulture as cottage industry	4	Lecture 2 ICT 2
1.3	Role of Central Silk Board	2	ICT
<b>UNIT 11</b>			
2.1	Moriculture - varieties of mulberry	3	Lecture 2 ICT 1
2.2	optimum conditions for mulberry growth planting systems methods of Propagation	5	Lecture 3 ICT 2
2.3	Harvesting of leaves	2	Discussion 1 Lecture 1
<b>UNIT III</b>			
3.1	Diseases of mulberry -bacterial- Leaf blight	3	Lecture 3

	disease		
3.2	fungal - White root rot, Trunk rot and Powdery mildew	4	ICT 2 Lecture 2
3.3	viral - Leaf mosaic disease - nematode disease - Root knot disease.	4	ICT 1 Lecture 3
3.4	Pests of Mulberry - leaf eater - <i>Spilosoma</i> , Sap feeder - <i>Empoasca</i> , stem borer - <i>Stheniasgrissator</i>	4	ICT 2 Lecture 2
<b>UNIT IV</b>			
4.1	Morphology of silkworms - mulberry and Non - mulberry silkworms	5	Lecture 3 ICT 2
4.2	sexual dimorphism in larva, pupa and adult.	5	Lecture 3 ICT 2
4.3	Structure and function of silk gland	2	Lecture
4.4	life cycle of <i>Bombyxmori</i>	3	ICT 2 Lecture 1
<b>UNIT V</b>			
5.1	Classification of silkworm races - based on moulting, voltinism, habitat and colour of cocoon	6	ICT 2 Lecture 4
5.2	Egg production - methods of industrial egg production	3	Lecture 2 ICT 1
5.3	Diapausing and non diapausing eggs	3	Discussion 1 ICT 2

Course Outcomes (Cos)	Programme Outcomes (Pos)					Programme Specific Outcomes (PSOs)							Mean scores of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	
CO1	3	4	3	4	3	3	3	4	3	3	3	4	3.33
CO2	3	4	3	4	3	3	4	3	4	3	3	4	3.41
CO3	4	3	5	4	3	3	3	4	4	3	4	3	3.58
CO4	4	4	3	4	3	3	4	3	4	3	3	3	3.41
CO5	3	3	3	4	3	3	4	3	4	3	4	4	3.42
<b>Mean Overall Score</b>												<b>3.44</b>	

**Result: The Score for this Course is 3.44 (High Relationship)**

<b>Mapping</b>	<b>1-20%</b>	<b>21-40%</b>	<b>41-60%</b>	<b>61-80%</b>	<b>81-100%</b>
<b>Scale</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Relation</b>	<b>0.0-1.0</b>	<b>1.1-2.0</b>	<b>2.1-3.0</b>	<b>3.1-4.0</b>	<b>4.1-5.0</b>
<b>Quality</b>	<b>Very Poor</b>	<b>Poor</b>	<b>Moderate</b>	<b>High</b>	<b>Very High</b>
<b>Mean Score of COs = <math>\frac{\text{Total of Value}}{\text{Total No. of Pos\&amp; PSOs}}</math></b>			<b>Mean Overall Score of COs = <math>\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}</math></b>		

<b>BLOOM'S TAXANOMY</b>	<b>INTERNAL</b>	<b>EXTERNAL</b>
<b>KNOWLEDGE</b>	<b>50%</b>	<b>50%</b>
<b>UNDERSTANDING</b>	<b>30%</b>	<b>30%</b>
<b>APPLY</b>	<b>20%</b>	<b>20%</b>

Programme : B.Sc Zoology  
 Semester : II  
 Sub. Code : AS2

Part III: Allied  
 Hours :4P/W 60Hrs P/S  
 Credits : 4

**TITLE OF THE PAPER: SERICULTURE II**

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDEOS/TUTORIAL	ICT	
		4	2	-	1	1
<b>PREAMBLE:</b>						
<p>The course offers platform to gain the knowledge on industrial application of reeling and marketing and to acquire entrepreneurial skill regarding silk testing</p>						
<b>COURSE OUTCOME</b>					<b>Unit</b>	<b>Hrs P/S</b>
At the end of the Semester, the Students will be able to						
<b>UNIT 1- CO1: Introduce the basic concepts of silkworm rearing</b>					<b>1</b>	<b>10</b>
<b>UNIT 2 -CO2: Help the students to identify disease and pest affecting silkworm</b>					<b>2</b>	<b>15</b>
<b>UNIT 3 -CO3.Involves students to gain thorough knowledge about cocoons</b>					<b>3</b>	<b>15</b>
<b>UNIT 4 -CO4:.Provide adequate knowledge about processing of cocoons</b>					<b>4</b>	<b>10</b>
<b>UNIT 5 -CO5:Throws light on marketing of sericulture products</b>					<b>5</b>	<b>10</b>
<b>SYLLABUS</b>						
<b>UNIT I:</b>						
Rearing of silkworm, rearing appliances, rearing operation, maintenance of optimum temperature and humidity, chawki rearing - late age rearing.						
<b>UNIT II:</b>						
Diseases of silkworm, Protozoan – Pebrine, Bacterial - Septicemia, Viral - NPV and Fungal Muscardine.						
Pests of silkworm - Uzifly, Dermestid.						
<b>UNIT III:</b>						
Mounting and spinning, Types of mountages, Mounting, Spinning and harvesting of cocoons Marketing of cocoons.						
<b>UNIT IV:</b>						
Cocoon processing and reeling, Stifling, sorting and riddling, Cocoon boiling - deflossing of cocoon.						



**Reeling - appliances used for reeling ,Reeling operation.**

**UNITV:**

**Raw silk and marketing,Raw silk testing, Silk conditioning,By products of sericulture,Spun silk.**

**TEXT BOOKS**

**1.Ganga G and SulochanaChetty J. An Introduction to sericulture. 2nd Edn., Oxford and IBH Pub., New Delhi,1994**

**2.Johnson M and Kesary M. Sericulture. 4thEdn., CSI Press, 2008**

**REFERENCES**

**1. Krishnaswami S. Sericulture Manual II - Silkworm rearing. Oxford & IBH Pub., Bombay, 1991**

**2.Rangasamy G. Sericulture Manual I - Mulberry cultivation. Oxford and IBH Pub., Bomba  
1991**

**3.Sandhya Rani G. Sericulture and Rural Development. Discovery Pub., New Delhi, 1998**

**Course designer :Dr.S.Mala**

**Course Contents and Lecture Schedule**

<b>UNITS</b>	<b>TOPIC</b>	<b>LECTURE HOURS</b>	<b>MODE OF TEACHING</b>
<b>UNIT 1</b>			
<b>1.1</b>	<b>Rearing of silkworm</b>	<b>2</b>	<b>Lecture-2</b>
<b>1.2</b>	<b>Rearing appliances</b>	<b>3</b>	<b>ICT-1,lecture-2</b>
<b>1.3</b>	<b>Rearing operation</b>	<b>3</b>	<b>Models with lecture -3</b>
<b>1.4</b>	<b>Maintenance of optimum temperature and humidity.</b>	<b>1</b>	<b>Lecture-1</b>
<b>1.5</b>	<b>Chawki rearing - late age rearing.</b>	<b>1</b>	<b>Visual aids with lecture-1</b>
<b>UNIT 11</b>			
<b>2.1</b>	<b>Diseases of silkworm</b>	<b>3</b>	<b>Lecture with Charts-3</b>
<b>2.2</b>	<b>Protozoan – Pebrine</b>	<b>3</b>	<b>ICT-1,lecture-2</b>
<b>2.3</b>	<b>Bacterial- Septicemia</b>	<b>3</b>	<b>Lecture with Videos-3</b>
<b>2.4</b>	<b>Viral - NPV</b>	<b>3</b>	<b>Visual aids with explanation-3</b>
<b>2.5</b>	<b>Fungal - Muscardine.</b>	<b>3</b>	<b>ICT-1,lecture-2</b>

<b>UNIT III</b>			
3.1	Mounting and Spinning	3	Lecture-3
3.2	Types of mountages	2	Models with explanation-2
3.3	Mounting	4	Modelswith explanation-4
3.4	Spinning and harvesting of cocoons	4	ICT-1,lecture-3
3.5	Marketing of cocoons	2	Special lectures-2
<b>UNIT IV</b>			
4.1	Cocoon processing and reeling	2	Demonstrative lecture-2
4.2	Stifling, sorting and riddling	2	Demonstrative lecture-2
4.3	Cocoonboiling deflossing of cocoon.	2	ICT-1,lecture-1
4.4	Reeling appliances used for reeling	2	ICT-1,lecture-1
4.5	Reeling operation.	2	ICT-1,lecture-1
<b>UNIT V</b>			
5.1	Raw silk and marketing	2	Lecture 2
5.2	Raw silk testing	3	Charts-1,lecture-2
5.3	Silk conditioning	1	Demonstration
5.4	By products of sericulture	2	Visual aids with lecture -2
5.5	Spun silk.	1	ICT-1
5.6	Raw silk and marketing	1	Lecture-1

Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)Mean scores of Cos							Mean scores of Cos
	PO1	PO2	PO3	PO4	PO5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	
CO1	3	4	3	3	5	2	4	4	3	3	3	3	3.3
CO2	4	4	3	3	5	3	3	4	4	3	4	3	3.58
CO3	3	5	3	3	3	4	3	3	4	3	3	4	3.41
CO4	3	4	4	3	4	3	4	4	3	4	4	3	3.58
CO5	4	3	4	3	3	4	3	5	3	3	4	4	3.58
	<b>Mean Overall Score</b>												<b>3.49</b>

**Result: The Score for this Course is 3.49(High Relationship)**

<b>Mapping</b>	<b>1-20%</b>	<b>21-40%</b>	<b>41-60%</b>	<b>61-80%</b>	<b>81-100%</b>
<b>Scale</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Relation</b>	<b>0.0-1.0</b>	<b>1.1-2.0</b>	<b>2.1-3.0</b>	<b>3.1-4.0</b>	<b>4.1-5.0</b>
<b>Quality</b>	<b>Very Poor</b>	<b>Poor</b>	<b>Moderate</b>	<b>High</b>	<b>Very High</b>
<b>Mean Score of COs = <math>\frac{\text{Total of Value}}{\text{Total No. of Pos \&amp; PSOs}}</math></b>			<b>Mean Overall Score of COs = <math>\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}</math></b>		

<b>BLOOM'S TAXANOMY</b>	<b>INTERNAL</b>	<b>EXTERNAL</b>
<b>KNOWLEDGE</b>	<b>50%</b>	<b>50%</b>
<b>UNDERSTANDING</b>	<b>30%</b>	<b>30%</b>
<b>APPLY</b>	<b>20%</b>	<b>20%</b>

**Programme :B.Sc., Zoology**  
**Semester : I&II**  
**Sub. Code : SPA**

**Part III: Core/Allied/Elective**  
**Hours : 3P/W 90Hrs /Yr**  
**Credits: 3**

**TITLE OF THE PAPER: SERICULTURE PRACTICAL**

<b>Pedagogy</b>	<b>Hours</b>	<b>Lecture</b>	<b>Peer Teaching</b>	<b>GD/VIDEOS/TUTORIAL</b>	<b>ICT</b>	
	<b>3</b>	<b>1</b>	<b>1</b>	<b>-</b>	<b>1</b>	
<b>PREAMBLE:</b>						
<ul style="list-style-type: none"> <li>To Enhance knowledge and practical understanding about sericulture and Moriculture</li> <li>To develop entrepreneurial skills.</li> </ul>						
<b>COURSE OUTCOME</b>					<b>Unit</b>	<b>Hrs P/Yr</b>
<b>At the end of the Semester, the Students will be able to</b>						
<b>UNIT 1 CO1: Gain knowledge on life cycle of <i>B.mori</i> and its sex differentiation; understand morphology of silk gland</b>					<b>1</b>	<b>20</b>
<b>UNIT 2 CO2: Understand the structure &amp; function of spiracles and Mulberry diseases</b>					<b>2</b>	<b>16</b>
<b>UNIT 3 CO3: Gain knowledge on rearing and reeling appliances</b>					<b>3</b>	<b>18</b>
<b>UNIT 4 CO4: Assess and quantify the quality of normal from defective cocoons</b>					<b>4</b>	<b>18</b>
<b>UNIT 5 CO5: Understand diseases of silk worm</b>					<b>5</b>	<b>18</b>

## SYLLABUS

<b>UNIT I:</b>	Life Cycle of <i>Bombyx mori</i> Identification of male & female larvae and pupae of <i>Bombyx mori</i> Dissection of Silk gland
<b>UNIT II:</b>	Mounting of Spiracles Diseases of Mulberry – Leaf blight, Powdery mildew, Leaf Mosaic
<b>UNIT III:</b>	Farm implements and their uses Rearing appliances Layout of Model rearing house Reeling appliance – Country charka
<b>UNIT IV:</b>	Identification of defective mulberry cocoon Identification of Non-mulberry silkworm Identification of Non-mulberry cocoon
<b>UNIT V:</b>	Diseases of silkworm – Pebrine, Septicemia, NPV, Muscardine, Uzifly

Course designer: Dr.D. Helen Christina

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
<b>UNIT I</b>			
1.1	Life Cycle of <i>Bombyx mori</i>	6	
1.2	Identification of male & female larvae and pupae of <i>Bombyx mori</i>	6	Demonstration - 4Practical -4
1.3	Dissection of Silk gland	8	Demonstration - 4Practical -4
<b>UNIT II</b>			
2.1	Mounting of Spiracles	8	Practical
2.2	Diseases of Mulberry – Leaf blight, Powdery mildew, Leaf Mosaic	8	Demonstration - Practical -4
<b>UNIT III</b>			
3.1	Farm implements and their uses	6	Demonstration, Peer teaching
3.2	Rearing appliances	6	Demonstration, Peer teaching
3.3	Layout of Model rearing house Reeling appliance – Country charka	6	Tutorial
<b>UNIT IV</b>			
4.1	Identification of defective mulberry	9	Demonstration Practical

	cocoon		
4.2	Identification of Non-mulberry silkworm Identification of Non-mulberry cocoon	9	Demonstration Tutorial
<b>UNIT V</b>			
5.1	Diseases of silkworm – Pebrine, Septicemia, NPV	9	Tutorial
5.2	Diseases of silkworm – Muscardine, Uzifly	9	Tutorial

Course Outcomes (COs)	Programme Outcomes (Pos)					Programme Specific Outcomes (PSOs)							Mean scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	
CO1	4	3	3	3	3	4	4	4	4	3.5	4	3	3.5
CO2	4	3	4	3	3	4	4	3	3	3.5	4	3	3.4
CO3	4	4	3	3	3	4	4	4	4	3	3	3	3.3
CO4	4	4	3	3	3	4	4	4	4	3	3	3	3.4
CO5	3	3	3	3	3	3	3	4	4	3	3	4	3.2
<b>Mean Overall Score</b>												<b>3.36</b>	

Result: The Score for this Course is 3.36 (High Relationship)

<b>Mapping</b>	<b>1-20%</b>	<b>21-40%</b>	<b>41-60%</b>	<b>61-80%</b>	<b>81-100%</b>
<b>Scale</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Relation</b>	<b>0.0-1.0</b>	<b>1.1-2.0</b>	<b>2.1-3.0</b>	<b>3.1-4.0</b>	<b>4.1-5.0</b>
<b>Quality</b>	<b>Very Poor</b>	<b>Poor</b>	<b>Moderate</b>	<b>High</b>	<b>Very High</b>

<b>Mean Score of COs = <math>\frac{\text{Total of Value}}{\text{Total No. of Pos \&amp; PSOs}}</math></b>	<b>Mean Overall Score of COs = <math>\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}</math></b>
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<b>BLOOM'S TAXANOMY</b>	<b>INTERNAL</b>	<b>EXTERNAL</b>
<b>KNOWLEDGE</b>	<b>50%</b>	<b>50%</b>
<b>UNDERSTANDING</b>	<b>30%</b>	<b>30%</b>
<b>APPLY</b>	<b>20%</b>	<b>20%</b>

Programme : B. Sc Zoology  
Semester : III  
Sub. Code : AZ1

Part III: Allied  
Hours : 4 P/W 60Hrs P/S  
Credits: 3

**TITLE OF THE PAPER: GENERAL ZOOLOGY I**

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDEOS/TUTORIAL	ICT	
	4	2		1	1	
<b>PREAMBLE: To impart knowledge and understanding on the classical and advanced topics of Zoology</b>						
<b>COURSE OUTCOME</b>					<b>Unit</b>	<b>Hrs P/S</b>
<b>At the end of the Semester, the Students will be able to</b>						
<b>UNIT 1- CO1: Learn classification of Invertebrates and disease causing parasites</b>					<b>1</b>	<b>13</b>
<b>UNIT 2 -CO2: Gain knowledge and Understand Chordate classification , behavioural pattern and adaptations in animals</b>					<b>2</b>	<b>13</b>
<b>UNIT 3- CO3: Characterize genetic basis of sex determination and related chromosomal abnormalities</b>					<b>3</b>	<b>11</b>
<b>UNIT 4 -CO4: Describe basic principles of evolution and adaptive characters</b>					<b>4</b>	<b>11</b>
<b>UNIT 5 -CO5: Explain and associate biological rhythm patterns and learning process in animals</b>					<b>5</b>	<b>12</b>
<b>SYLLABUS</b>						
<b>UNIT I: Invertebrata</b>						
Classification of Invertebrates. Life History of <i>Plasmodium vivax</i> , <i>Wuchereria bancroftii</i> , <i>Ascaris lumbricoides</i> , <i>Taenia solium</i> .						
<b>UNIT II: Chordata</b>						
Classification of Chordates, Migration of fishes – Anadromous & Catadromous. Parental care in Amphibia. Identification of South Indian Poisonous Snakes – Poison apparatus – Biting mechanism. Flight adaptation in birds. Adaptive Radiation in Mammals.						
<b>UNIT III: Genetics</b>						
Definition of Gene and Karyotype. Sex determination in man; Sex linked inheritance – Colour blindness. Chromosomal abnormalities - Aneuploidy, Polyploidy, Down's syndrome, Turner's syndrome						
<b>UNIT IV: Evolution</b>						
Basic Principles of Lamarkism and Darwinism. Isolation – Mimicry – Batesian & Mullerian. Colouration						
<b>UNIT V: Animal Behaviour</b>						
Biological Rhythm – Circadian, Circannual and Lunar rhythms. Classical Conditioning. Social Behaviour – Flocking in Birds, Herding in Mammals						
<b>REFERENCES:</b>						

1. Jordan EL and Verma PS. Invertebrate zoology. S. Chand and Company Ltd., 2012
2. Thangamani T and Arumugam N. A Text book of Chordates. Saras Pub., 1992
3. Meyyan R P., Genetics. Saras Publications , 2019
4. Krishnamoorthy K. Introduction to Biodiversity. Oxford and IBH, 2003
5. Agarwal VK. Animal Behaviour (Ethology). S. Chand Pub., New Delhi, 2013

Course designer:

### Course Contents and Lecture Schedule

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
<b>UNIT I</b>			
1.1	Classification of Invertebrates	3	Lecture 3
1.2	Life History of <i>Plasmodium vivax</i>	4	Lecture 3 Video 1
1.3	Life History of <i>Wuchereria bancroftii</i>	2	Lecture 2
1.4	Life History of <i>Ascaris lumbricoides</i>	2	Lecture 2
1.5	Life History of <i>Taenia solium</i>	2	Lecture 2
<b>UNIT II</b>			
2.1	Classification of Chordates,	2	Lecture 2
2.2	Migration of fishes – Anadromous & Catadromous. Parental care in Amphibia.	4	Lecture 2 Video 1 ICT 1
2.3	Identification of South Indian Poisonous Snakes – Poison apparatus – Biting mechanism.	3	Lecture 2 Video 1
2.4	Flight adaptation in birds. Adaptive Radiation in Mammals	4	Lecture 2 ICT 2
<b>UNIT III</b>			
3.1	Definition of Gene and Karyotype. Sex determination in man	3	Lecture 2 GD 1
3.2	Sex linked inheritance – Colour blindness.	3	Lecture 2 GD 1
3.3	Chromosomal abnormalities - Aneuploidy, Polyploidy, Down's syndrome, Turner's syndrome	5	Lecture 3 GD 1 Video 1
<b>UNIT IV</b>			
4.1	Basic Principles of Lamarkism and Darwinism	4	Lecture 4
4.2	Isolation – Mimicry – Batesian & Mullerian.	4	Lecture 3 ICT 1
4.3	Colouration	3	Lecture 3
<b>UNIT V</b>			
5.1	Biological Rhythm – Circadian, Circannual and Lunar rhythms	5	Lecture 3 Video 2
5.2	Classical Conditioning	2	Lecture 2
5.3	Social Behaviour – Flocking in Birds, Herding in Mammals	4	Lecture 2 video 2

Course Outcomes (Cos)	Programme Outcomes (Pos)					Programme Specific Outcomes (PSOs)							Mean scores of Cos
	PO1	PO2	PO3	PO4	PO5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO6	PSO 7	
CO1	2	4	3	4	4	2	5	4	3	4	3	4	3.5
CO2	3	3	4	2	4	3	4	4	3	4	4	3	3.4
CO3	2	4	3	3	3	2	5	4	3	3	4	4	3.5
CO4	3	2	3	4	2	3	4	5	4	4	4	4	3.4
CO5	3	4	3	2	4	2	5	4	3	4	3	3	3.5
<b>Mean Overall Score</b>												<b>3.46</b>	

**Result: The Score for this Course is 3.46 (High Relationship)**

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High

Mean Score of COs =  $\frac{\text{Total of Value}}{\text{Total No. of Pos \& PSOs}}$

Mean Overall Score of COs =  $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$

BLOOM'S TAXANOMY	INTERNAL	EXTERNAL
KNOWLEDGE	50%	50%
UNDERSTANDING	30%	30%
APPLY	20%	20%



Semester : IV  
Sub. Code : AZ2

Hours : 4 P/W 60Hrs P/S  
Credits: 4

**TITLE OF THE PAPER: GENERAL ZOOLOGY II**

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDOES/TUTORIAL	ICT	
	4	2	-	1	1	
<b>PREAMBLE: Enrich knowledge on the advanced level Zoology and its application in the fields of medicine and research</b>						
<b>COURSE OUTCOME</b>					<b>Unit</b>	<b>Hrs P/S</b>
<b>At the end of the Semester, the Students will be able to</b>						
<b>UNIT 1- CO1: Describe and appreciate cellular structure and functions</b>					<b>1</b>	<b>14</b>
<b>UNIT 2- CO2: Understand the significance of immune system and immune responses</b>					<b>2</b>	<b>14</b>
<b>UNIT 3-CO3: Gain knowledge and discuss on the structure of Bacteria , Fungi and Virus</b>					<b>3</b>	<b>12</b>
<b>UNIT 4 -CO4: Apply molecular basis of enzymes and vectors in research</b>					<b>4</b>	<b>10</b>
<b>UNIT 5 -CO5: Understand the ecological importance of Biodiversity and animal conservation</b>					<b>5</b>	<b>10</b>

**SYLLABUS**

**UNIT I: Cell and Molecular Biology**

Ultra Structure of Cell, Types and Functions of Cytoplasmic organelles – Endoplasmic Reticulum, Golgi Complex and Mitochondria. Nuclear Components – nucleus, Nucleolus, Chromosome – Structure of DNA, Properties of Genetic Code – DNA Replication.

**UNIT II: Immunology**

Types of Immunity – Innate and Acquired – Primary and Secondary immune response. Immune cells and Organs – Types and functions.

**UNIT III: Microbiology**

Bacteria – Structure of E. coli, Characteristics of Gram positive and Gram negative bacteria. Fungi – Morphology – Eg: Penicillium. Virus – Structure of T4.

**UNIT IV: Biotechnology**

Enzymes as Molecular Tools - . Cloning Vector – Plasmid – PBr 322. PCR – Methods & Application

**UNIT V: Biodiversity & Conservation**

Biodiversity Hotspots of India – Endemic and Endangered species – IUCN, Red Data Book, - Impact of Climate change.

**REFERENCES:**

1. Powar CB. Cell Biology. 3<sup>rd</sup> Edn., Himalaya Pub., 1983
2. Eli Benjamin. Immunology - A short course. A. John Wiley & Sons Pub., New York, 1996
3. Dubey RC and Maheswari DK. A Text Book of Microbiology. S. Chand and Company, New Delhi, 2013
4. Kumaresan V. Biotechnology. Saras Pub., 2016
5. Joshi PC and Namita J. Biodiversity and Conservation. APH Pub., New Delhi, 2004

Course designer : Dr. D. Helen Christina

### Course contents and lecture schedule

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
<b>UNIT I</b>			
1.1	Ultra Structure of Cell	2	Lecture 2
1.2	Types and Functions of Cytoplasmic organelles – Endoplasmic Reticulum, Golgi Complex and Mitochondria	5	Lecture 3 Video 2
1.3	Nuclear Components – nucleus, Nucleolus, Chromosome	2	Lecture 2 GD 1
1.4	Structure of DNA, Properties of Genetic Code – DNA Replication	5	Lecture 3 ICT 1 Video 1
<b>UNIT II</b>			
2.1	Types of Immunity – Innate and Acquired	3	Lecture 2 ICT 1
2.2	Primary and Secondary immune response	2	Lecture 2
2.3	Immune cells– Types and functions	4	Lecture 2 Video 2
2.4	Immune Organs – Types and functions	5	Lecture 3 Video 2
<b>UNIT III</b>			
3.1	Bacteria – Structure of E. coli,	3	Lecture 2 GD 1
3.2	Characteristics of Gram positive and Gram negative bacteria.	4	Lecture 3 ICT 1
3.3	Fungi – Morphology – Eg: Penicillium	3	Lecture 3 GD 1
3.4	Virus – Structure of T4	2	Lecture 2
<b>UNIT IV</b>			
4.1	Enzymes as Molecular Tools	3	Lecture 2 GD 1
4.2	Cloning Vector – Plasmid – PBr 322	3	Lecture 2 ICT 1
4.3	PCR – Methods & Application	4	Lecture 3 Video 1
<b>UNIT V</b>			
5.1	Biodiversity Hotspots of India	3	Lecture 2 Video 1
5.2	Endemic and Endangered species – IUCN, Red Data Book,	4	Lecture 3 video 1

5.3	Impact of Climate change	3	Lecture 3
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Course Outcomes (Cos)	Programme Outcomes (Pos)					Programme Specific Outcomes (PSOs)							Mean scores of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	
CO1	2	3	4	4	3	2	3	5	3	5	4	4	3.5
CO2	3	4	3	4	3	3	5	3	4	3	3	4	3.5
CO3	2	5	3	4	4	2	5	4	3	3	3	4	3.5
CO4	3	4	3	5	3	3	4	5	3	2	4	3	3.5
CO5	2	3	4	4	3	3	4	4	4	3	3	3	3.3
<b>Mean Overall Score</b>												<b>3.46</b>	

**Result: The Score for this Course is 3.46 (High Relationship)**

<b>Mapping</b>	<b>1-20%</b>	<b>21-40%</b>	<b>41-60%</b>	<b>61-80%</b>	<b>81-100%</b>
<b>Scale</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Relation</b>	<b>0.0-1.0</b>	<b>1.1-2.0</b>	<b>2.1-3.0</b>	<b>3.1-4.0</b>	<b>4.1-5.0</b>
<b>Quality</b>	<b>Very Poor</b>	<b>Poor</b>	<b>Moderate</b>	<b>High</b>	<b>Very High</b>

Mean Score of COs =  $\frac{\text{Total of Value}}{\text{Total No. of Pos \& PSOs}}$

Mean Overall Score of COs =  $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$

BLOOM'S TAXANOMY	INTERNAL	EXTERNAL
KNOWLEDGE	50%	50%
UNDERSTANDING	30%	30%
APPLY	20%	20%

Programme : B. Sc Zoology  
 Semester : IV  
 Sub. Code : ZPA

Part III: Allied Practical  
 Hours : 3 P/W 45Hrs P/S  
 Credits: 3

**TITLE OF THE PAPER: GENERAL ZOOLOGY PRACTICAL**

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDOES/TUTORIAL	ICT	
	3			2	1	
<b>PREAMBLE:</b>						
This course will develop practical skills of the students by doing various experiments and to show how the form,function and behavior of animals become adapted to their position in animal kingdom and also the functions performed.						
<b>COURSE OUTCOME</b>					<b>Unit</b>	<b>Hrs P/S</b>
At the end of the Semester, the Students will be able to						
<b>UNIT 1-CO1: Identify various invertebrate and chordate slides/specimens/charts and relate their function</b>					<b>1</b>	<b>8</b>
<b>UNIT 2 -CO2: identify and comment on important patterns of inheritance and evolutionary mechanisms</b>					<b>2</b>	<b>7</b>
<b>UNIT 3 -CO3: enhance their skill towards preparation of onion root tip squash and also gain practical skill towards blood smear staining</b>					<b>3</b>	<b>12</b>
<b>UNIT 4- CO4: gain hands on experience on bacterial and fungal staining and mounting techniques</b>					<b>4</b>	<b>12</b>
<b>UNIT 5 -CO5: identify, draw and comment on the given spotters/charts</b>					<b>5</b>	<b>6</b>
<b>SYLLABUS</b>						
<b>UNIT I:</b>						
Spotters: Malarial Parasite, Ascaris, Tape worm, Poisonous snakes, Poison Apparatus						
<b>UNIT II: Spotters: Colour Blindness , Down’s Syndrome, Turner’s Syndrome, Mimicry- Batesian and Mullerian mimicry</b>						
<b>UNIT III: 1. Squash Preparation of Onion root tip</b>						
2. Blood Smear staining – identification of WBC						
3. Spotters – Cell Organelles – Endoplasmic Reticulum, Golgi complex, Mitochondria, DNA Structure,						
<b>UNIT IV: 1. Simple staining of Bacteria</b>						
2 Fungal Mounting						

**Spotters: Immune organs – Bone marrow, Thymus, Spleen and Lymph node**

**UNIT V: Spotters: Structure of Virus, PBr 322, PCR, Biodiversity hotspots of India**

**REFERENCES:**

1. Lal, Text Book of Practical Zoology, Rastogi Publishers, 2015
2. Rajan and Selvi Christy. Experimental Procedures in Life Sciences, CBS Publishers, 2015

**Course designer: Dr. V. Kabila**

**Course Contents and Lecture Schedule**

<b>UNITS</b>	<b>TOPIC</b>	<b>LECTURE HOURS</b>	<b>MODE OF TEACHING</b>
<b>UNIT I</b>			
<b>1.1</b>	<b>Malarial Parasite, Ascaris, Tape worm,</b>	<b>4</b>	<b>Lecture2 ICT2</b>
<b>1.2</b>	<b>Poisonous snakes, Poison Apparatus</b>	<b>4</b>	<b>Lecture3 Drawing practice1</b>
<b>UNIT II</b>			
<b>2.1</b>	<b>Colour Blindness Down's Syndrome, Turner's Syndrome,</b>	<b>4</b>	<b>Lecture2 ICT2</b>
<b>2.2</b>	<b>Mimicry-Batesian and Mullerian mimicry</b>	<b>3</b>	<b>Lecture1 ICT2</b>
<b>UNIT III</b>			
<b>3.1</b>	<b>Squash Preparation of Onion root tip</b>	<b>4</b>	<b>Demo2, practice2</b>
<b>3.2</b>	<b>Blood Smear staining – identification of WBC</b>	<b>4</b>	<b>Demo2, practice2</b>
<b>3.3</b>	<b>Spotters – Cell Organelles – Endoplasmic Reticulum, Golgi complex, Mitochondria, DNA Structure,</b>	<b>4</b>	<b>Lecture1 ICT2 Drawing practice1</b>
<b>UNIT IV</b>			
<b>4.1</b>	<b>Simple staining of Bacteria</b>	<b>4</b>	<b>Demo2, practice2</b>
<b>4.2</b>	<b>Mounting of fungi</b>	<b>4</b>	<b>Demo2, practice2</b>
<b>4.3</b>	<b>Spotters: Immune organs – Bone marrow, Thymus, Spleen and Lymph node</b>	<b>4</b>	<b>Lecture1 ICT2 Drawing practice1</b>
<b>UNIT V</b>			

5.1	Spotters: Structure of Virus, PBr 322, PCR,	3	Lecture1 ICT2
5.2	Biodiversity hotspots of India	3	Lecture1 ICT2

Course Outcomes (Cos)	Programme Outcomes (Pos)					Programme Specific Outcomes (PSOs)							Mean scores of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	
CO1	2	3	4	3	3	4	4	4	3	4	5	5	3.7
CO2	3	4	3	3	4	2	5	3	4	3	4	4	3.5
CO3	3	3	4	4	3	3	4	3	4	3	4	3	3.4
CO4	4	4	3	3	4	3	3	4	3	4	4	4	3.6
CO5	4	5	3	2	4	5	3	4	3	2	5	4	3.7
<b>Mean Overall Score</b>													<b>3.58</b>

**Result: The Score for this Course is 3.58 (High Relationship)**

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High
Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos \& PSOs}}$			Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$		

BLOOM'S TAXANOMY	INTERNAL	EXTERNAL
KNOWLEDGE	50%	50%
UNDERSTANDING	30%	30%
APPLY	20%	20%

**Programme : B.Sc ZOOLOGY**  
**Semester : V**  
**Sub. Code : NMZ1**

**Part III: Non Major Elective**  
**Hours : 2 P/W 30Hrs P/S**  
**Credits: 2**

**TITLE OF THE PAPER: HUMAN REPRODUCTIVE BIOLOGY**

<b>Pedagogy</b>	<b>Hours</b>	<b>Lecture</b>	<b>Peer Teaching</b>	<b>GD/VIDOES/TUTORIAL</b>	<b>ICT</b>	
	<b>2</b>	<b>1</b>	<b>-</b>	<b>1</b>	<b>-</b>	
<b>PREAMBLE:</b>						
<p>The course will provide basic knowledge on reproductive physiology for non-major students, make the students to learn the scientific facts about foetal growth and population control measures.</p>						
<b>COURSE OUTCOME</b>					<b>Unit</b>	<b>Hrs P/S</b>
<b>At the end of the Semester, the Students will be able to</b>						
<b>UNIT 1 - CO1:</b>					<b>1</b>	<b>6</b>
<p>To understand the structure of human Reproductive biology for non major students.</p>						
<b>UNIT 2 - CO2:</b>					<b>2</b>	<b>6</b>
<p>To gain the basic knowledge on reproductive biology for</p>						

<b>non major students</b>		
<b>UNIT 3 - CO3:</b> <b>To explain the different developmental stages of foetus , Immunization schedule and nutritional requirements</b>	<b>3</b>	<b>6</b>
<b>UNIT 4 - CO4:</b> <b>To demonstrate the parturition lactation and abortion during delivery</b>	<b>4</b>	<b>6</b>

## **SYLLABUS**

**UNIT I:** Reproductive system - Female reproductive organ – structure, oogenesis. menstrual cycle – hormones. Male reproductive organ – structure – spermatogenesis - hormones.

**UNIT II:** Fertilization – beginning of life – blastula, implantation, gestation period – pregnancy – signs and symptoms –pregnancy test – hormonal changes.

**UNIT III:** Stages of foetal development – trimester stages – placenta – functions – care during pregnancy – immunization for mother – nutritional requirements.

**UNIT IV:** Parturition – lactation – abortion and still born during delivery – causes.

**UNIT V:** Infertility in male and female – causes. Birth control measures – reproductive tract infections – sexually transmitted diseases.

### **REFERENCES:**

1. Handouts prepared by Family Planning Association of India
2. Kemper D. Health wise Handbook
3. Townsend L. Obstetrics for students, 3<sup>rd</sup>Edn. Macmillan Company, 2003

<b>UNIT 5 - CO5:</b> <b>To describe the male and female infertility , birth control measures , Sexually transmitted diseases.</b>	<b>5</b>	<b>6</b>
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**Course Designer: P.Yuvarani**



### Course content and Lecture Schedule

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
<b>UNIT 1</b>			
1.1	Reproductive system-female reproductive organ	2	Lecture - 1, Charts- 1
1.2	Structure, oogenesis. menstrual cycle	2	Lecture - 1, Charts – 1
1.3	Male reproductive organ – structure – spermatogenesis – hormones	2	Lecture - 1, Charts - 1
<b>UNIT 11</b>			
2.1	Fertilization – beginning of life	2	Lecture - 1 , Charts- 1
2.2	Blastula, implantation, gestation period	2	Lecture - 1 , Visual aids-1
2.3	Pregnancy – signs and symptoms – pregnancy test- hormonal changes	2	Lecture -1 , Chart -1
<b>UNIT III</b>			
3.1	Stages of foetal development – trimester stages – placenta – functions	3	Visual aids-1,Charts- 1, Lecture -1
3.2	Care during pregnancy – immunization for mother – nutritional requirements.	3	Visual aids- 1, Charts -1, Lecture - 1
<b>UNIT IV</b>			
4.1	Parturition – lactation	3	Visual aids- 1, Charts -1, Lecture - 1
4.2	Abortion and delivery – causes.	3	Visual aids- 1, Charts -1, Lecture - 1
<b>UNIT V</b>			
5.1	Infertility in male and female – causes	2	Lecture - 1,Charts – 1
5.2	Birth control measures	2	Lecture- 1,Visual aids-1
5.3	Reproductive tract infections – sexually transmitted diseases	2	Lecture-1, Visual aids – 1

Course Outcomes (Cos)	Programme Outcomes (Pos)							Programme Specific Outcomes (PSOs)							Mean scores of Cos
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PS O1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	
CO1	3	4	3	3	5	3	3	2	4	4	3	3	3	3	3.24
CO2	4	3	3	4	4	4	4	3	3	3	4	4	4	3	3.57
CO3	5	3	3	4	4	4	3	4	3	3	3	4	4	4	3.64
CO4	4	4	4	3	3	4	3	4	4	3	3	3	4	4	3.57
CO5	3	3	3	3	4	4	4	4	4	4	4	3	3	3	3.50
<b>Mean Overall Score</b>														<b>3.50</b>	

**Result: The Score for this Course is 3.50 (High Relationship)**

<b>Mapping</b>	<b>1-20%</b>	<b>21-40%</b>	<b>41-60%</b>	<b>61-80%</b>	<b>81-100%</b>
<b>Scale</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Relation</b>	<b>0.0-1.0</b>	<b>1.1-2.0</b>	<b>2.1-3.0</b>	<b>3.1-4.0</b>	<b>4.1-5.0</b>
<b>Quality</b>	<b>Very Poor</b>	<b>Poor</b>	<b>Moderate</b>	<b>High</b>	<b>Very High</b>
<b>Mean Score of COs = <math>\frac{\text{Total of Value}}{\text{Total No. of Pos \&amp; PSOs}}</math></b>			<b>Mean Overall Score of COs = <math>\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}</math></b>		

<b>BLOOM'S TAXANOMY</b>	<b>INTERNAL</b>	<b>EXTERNAL</b>
<b>KNOWLEDGE</b>	<b>50%</b>	<b>50%</b>
<b>UNDERSTANDING</b>	<b>30%</b>	<b>30%</b>
<b>APPLY</b>	<b>20%</b>	<b>20%</b>

**Programme : UG**

**Semester : VI**

**Sub.Code : NMZ2**

**Part III: Non Major Elective 2**

**Hours :2 P/W 30Hrs P/S**

**Credits:2**

**TITLE OF THE PAPER - WOMEN AND CHILD CARE**

<b>Pedagogy</b>	<b>Hours</b>	<b>Lecture</b>	<b>Peer teaching</b>	<b>GD/VIDEOS/TUTORIAL</b>	<b>ICT</b>
	<b>2</b>	<b>1</b>		<b>-</b>	<b>1</b>

**PREAMBLE**

The course will provide basic knowledge and importance of mother and child health care and to create awareness on the significance of nutrition and preventing deficiency diseases

<b>COURSE OUTCOME</b>	<b>Unit</b>	<b>Hrs P/S</b>
<b>At the end of the Semester, the Students will be able to</b>		
<b>UNIT 1 - CO1 : Demonstrate the awareness of prevention of common diseases to avoid child health problems</b>	<b>1</b>	<b>6</b>
<b>UNIT 2 - CO2 : Take into account the values and management of personnel hygiene</b>	<b>2</b>	<b>6</b>
<b>UNIT 3 - CO3 : Interpret and perform child care.</b>	<b>3</b>	<b>6</b>
<b>UNIT 4 - CO4 : Assess the nutritional requirement of women</b>	<b>4</b>	<b>6</b>
<b>UNIT 5 - CO5 : Recognize, analyse and treat Nutritional deficiency diseases</b>	<b>5</b>	<b>6</b>

**SYLLABUS****UNIT I :**

Care of nursing / lactating mother – post natal care. Neonatal care – infant feeding formula, immunization schedule for children.

**UNIT II:**

Minor ailments in children – common fever, cold, diarrhoea, vomiting, behavioural problems – causes and prevention – habit formation.

**UNIT III:**

General and personal hygiene – menopause – psychological and physical needs.

**UNIT IV:**

Nutritional requirement for women – puberty and adult stage – aging process.

**UNIT V:**

Nutritional deficiency diseases – iron deficiency anemia – zinc and folic acid deficiency, osteoporosis, hypertension.

**Reference Books:**

1. Handouts prepared by Family Planning Association of India
2. Palanikumar P. Healthy diet. New Horizon Printers, 2007
3. Rajaraman. Child development - A psychological approach. Manora Pub., 2006

Course Designer :Dr. C. Rani vijaya

**COURSE CONTENTS AND LECTURE SCHEDULE**

<b>UNITS</b>	<b>TOPIC</b>	<b>LECTURE HOURS</b>	<b>MODE OF TEACHING</b>
<b>UNIT 1</b>			
1.1	Care of nursing / lactating mother	2	Lecture -1, video demonstration-1
1.2	Post natal care. Neonatal care	2	Lecture-1, video demonstration-1
1.3	Infant feeding formula, immunization schedule for children.	2	Lecture -1, video demonstration-1
<b>UNIT 2</b>			

2.1	Infant feeding formula, immunization schedule for children.	2	Lecture -1, video demonstration-1
2.2	Common fever, cold, diarrhoea, vomiting, behavioural problems	2	Lecture -1, video demonstration-1
2.3	causes and prevention – habit formation	2	Lecture -1, ICT-1
<b>UNIT 3</b>			
3.1	General and personal hygiene	2	Lecture -1, ICT-1
3.2	Menopause	2	Lecture -1, ICT-1
3.3	Psychological and physical needs	2	Lecture -1, ICT-1
<b>UNIT 4</b>			
4.1	Nutritional requirement for women	2	Lecture -1, ICT-1
4.2	Puberty and adult stage	2	Lecture -1, ICT-1
4.3	Aging process	2	Lecture -1, ICT-1
<b>UNIT 5</b>			
5.1	Nutritional deficiency diseases	2	Lecture -1, ICT-1
5.2	Iron deficiency anemia – zinc and folic acid deficiency,	2	Lecture -2
5.3	Osteoporosis, hypertension	2	Lecture -1, video demonstration-1

Course Outcomes (Cos)	Programme outcomes (POs)					Programme specific outcomes (PSOs)							Mean Scores Of Cos
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	
CO 1	4	4	4	4	4	4	4	3	4	4	3	4	3.8
CO 2	4	4	4	4	4	4	4	3	4	4	4	4	3.9
CO 3	4	3	4	4	4	4	4	4	4	4	4	4	3.9
CO 4	3	4	3	3	4	3	3	4	3	4	4	4	3.5
CO 5	4	3	4	4	3	4	4	4	3	3	4	4	3.6
<b>Mean overall score</b>												<b>3.7</b>	

**Result: The score for this course is 3.7 (High relationship)**

<b>Mapping</b>	<b>1-20%</b>	<b>21-40%</b>	<b>41-60%</b>	<b>61-80%</b>	<b>81-100%</b>
<b>Scale</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Relation</b>	<b>0.0-1.0</b>	<b>1.1-2.0</b>	<b>2.1-3.0</b>	<b>3.1-4.0</b>	<b>4.1-5.0</b>
<b>Quality</b>	<b>Very Poor</b>	<b>Poor</b>	<b>Moderate</b>	<b>High</b>	<b>Very High</b>
<b>Mean Score of COs = <math>\frac{\text{Total of Value}}{\text{Total No. of Pos \&amp; PSOs}}</math></b>			<b>Mean Overall Score of COs = <math>\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}</math></b>		

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<b>KNOWLEDGE</b>	<b>50%</b>	<b>50%</b>
<b>UNDERSTANDING</b>	<b>30%</b>	<b>30%</b>
<b>APPLY</b>	<b>20%</b>	<b>20%</b>