

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086  
B.Sc. DEGREE: BRANCH V.I.A. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY

SYLLABUS  
(Effective from the academic year 2015 -2016)

ECONOMIC ZOOLOGY

CODE: 15ZL/MC/EZ14

CREDITS : 4

L T P : 4 0 0

TOTAL TEACHING HOURS: 52

OBJECTIVES OF THE COURSE

- To acquire a knowledge of the economic value of animals
- To encourage entrepreneurship among students

Unit 1

**Beneficial Insects and their Culture (10 hrs.)**

- 1.1 Apiculture: Different Species - Social Organisation - Equipment Connected with Bee-Keeping - Bee Products (Honey, Beeswax, and their Uses) - Diseases and Enemies of Bees - Apiculture in India – Impact of Pesticides on Dwindling Bee Population
- 1.2 Sericulture: Different Types of Silkworms used in Sericulture – Life-History of *Bombyx mori* - Rearing and Diseases of Silkworms - Economic Importance

Unit 2

**Insect Pests (8 hrs.)**

- 2.1 Outline Study - Salient Features, Nature of Destruction Caused and Control Measures of Pests of Paddy, Cotton and Sugar Cane (Any Three Major Pests of each Crop) - Stored Food Grains (Rice and Pulses)
- 2.2 Identification of Common Pests of Fruits and Vegetables (Any Three Pests)
- 2.3 Integrated Pest Management

Unit 3

**Soil Enrichment (10 hrs.)**

- 3.1 Economically Important Soil Animals: Millipedes and Centipedes – Snails and Slugs – Their Importance in Soil Ecosystem
- 3.2 Vermitechnology: Vermiculture – Vermicomposting and Vermiwash – Setting up of Vermipit
- 3.3 Termites: Characteristics of Mound Soils – Decomposition of Organic Matter – Termitophiles – Termite Damage to Crops and Buildings – Control Measures
- 3.4 Soil Microarthropods: Extracting and Sampling Methods

Unit 4

**Aquaculture (13 hrs.)**

- 4.1 Kinds of Aquaculture: Mono, Poly, Extensive, Semi-Intensive, Intensive, Super Intensive and Monosex - Sewage and Integrated Fish Farming (A Brief Account)
- 4.2 Culture of Selected Species: Major Carps, Prawns and Oysters
- 4.3 Culturable Species of Feed Animals: *Artemia sp.*, *Daphnia sp.*, and Rotifers

- 4.4 Recent Trends in Aquaculture: Hypophysation – Eye Stalk Ablation– Use of Genetic Engineering Techniques
- 4.5 Preservation and Processing of Fish and Prawns: Chilling, Freezing, Freeze-Drying, Smoking, Salting and Canning – By products of Fishing Industry

**Unit 5**

**Economic Importance of Poultry and Mammals (11 hrs.)**

- 5.1 Poultry Science: Different Breeds of Fowls - Selective Breeding, Housing and Rearing - Role of Nutrition in Egg Laying - Common Diseases - Economic Importance
- 5.2 Economic Importance of Mammals: Indirect and Direct Value of Mammals - Dairy and Piggery Farming

**TEXT BOOKS**

Shukla, G.S. and V.B. Upadhyay. *Economic Zoology*. Meerut: Rastogi, 2010.

**BOOKS FOR REFERENCE**

Ahsan, J. and S.P. Sinha. *Handbook of Economic Zoology*. New Delhi: S. Chand, 2009.

Ayyar, T.V. R. *Handbook of Economic Entomology*. Madras: Govt, 1985.

Banerjee, G.C. *Poultry*. New Delhi: Oxford and IBH, 1992.

Daugherty, Lewis Sylvester. *Principles of Economic Zoology*. General Books, 2012.

David, Vasantharaj. B. *Pest Management and Pesticides*. Madras: Namrutha Publications, 1992.

Ismail, S.A., *The Earthworm Book*. Goa: India, 2005.

Jhinghran, V.G. *Fish and Fisheries of India*. New Delhi: Hindustan Publishing Corporation, 1982.

Mishra R.C. *Perspectives in Indian Apiculture*. Jodhpur: Agrobios, 2002.

Mohan Rao Madan. *Comprehensive Sericulture Manual*. Jodhpur: B.S. Publications, 1999.

Rajesh, K. *Applied Zoology*. Varanasi: Green Leaf, 2013

Vasanthraj, B. and T.N. Ananthakrishnan. *General and Applied Entomology*. Tata McGraw Hill, 2004.

**JOURNALS**

The Journal of Basic and Applied Zoology

Zootecnia Tropical

Fishery Technology

International Journal of Zoological Research

## **WEB RESOURCES**

<http://www.beeculture.com/>  
<https://www.karnataka.gov.in/sericulture/>  
<http://www.appropedia.org/>  
<http://www.epa.gov/>  
<http://www.enaca.org/>  
<http://www.vegetableipmasia.org/index>

## **PATTERN OF EVALUATION**

### **Continuous Assessment:**

**Total Marks: 50**

**Duration: 90 mins**

Section A – 6 x 2 = 12 Marks (All questions to be answered)

Section B – 3 x 6 = 18 Marks (3 out of 5 to be answered)

Section C – 1 x 20 = 20 Marks (1 out of 2 to be answered)

### **Third Component:**

List of evaluation modes:

Scrap book

Poster/model making

Quiz

Assignment

### **End Semester Examination**

**Total Marks: 100**

**Duration: 3 hours**

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086**  
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**BIOTECHNOLOGY**  
**SYLLABUS**  
**(Effective from the academic year 2015 -2016)**

**INVERTEBRATA**

**CODE: 15ZL/MC/IV14**

**CREDITS: 4**

**L T P: 4 0 0**

**TOTAL TEACHING HOURS: 52**

**OBJECTIVES OF THE COURSE**

- To highlight the characteristic features of various phyla, with one type under each phylum
- To study the classification of each phylum up to class level with underlying principles and local examples wherever possible
- To learn the economic, medicinal and phylogenetic significance of invertebrates

**Unit 1 (9 hrs.)**

- 1.1 Introduction and Outline Classification of Animal Kingdom
- 1.2 Phylum Protozoa: Characteristic Features - Type: *Paramecium caudatum*
- 1.3 Locomotion in Protozoa
- 1.4 Parasitic Protozoans: *Entamoeba histolytica*, *Trichomonas spp.* and *Plasmodium sp.*

**Unit 2 (10 hrs.)**

- 2.1 Phylum Porifera: Characteristic Features - Type : *Sycon*
- 2.2 Canal System in Sponges – Economic Importance of Porifera – Sponge Industry – Sponge Fishing – Sponge Cultivation
- 2.3 Phylum Coelenterata: Characteristic Features - Type : *Obelia geniculata*
- 2.4 Polymorphism in Coelenterates - Corals and Coral Reefs – Environmental Impact - Conservation

**Unit 3 (11 hrs.)**

- 3.1 Phylum Platyhelminthes: Characteristic Features - Type : *Taenia solium*
- 3.2 Helminth Parasites in Relation to Human Welfare: *Schistosoma haematobium*, *Taenia solium*, *Echinococcus granulosus*, *Ancylostoma duodenale*, *Wuchereria bancrofti* and *Enterobius vermicularis*
- 3.3 Phylum Annelida: Characteristics Features - Type: *Hirudinaria granulosa* - Medicinal Significance
- 3.4 Diversity of Annelids

**Unit 4 (12 hrs.)**

- 4.1 Phylum Arthropoda: Characteristic Features - Type : *Panurginus indicus*
- 4.2 Structure and Phylogenetic Significance of *Peripatus*
- 4.3 Mouthparts and their Modification in Insects
- 4.4 Social Life in Insects: Termites, Ants and Honey Bees

**Unit 5 (10 hrs.)**

- 5.1 Phylum Mollusca: Characteristic Features -Type : *Pila globosa*
- 5.2 Economic Importance of Molluscs
- 5.3 Phylum Echinodermata: Characteristic Features -Type : *Asterias sp*
- 5.4 Larval Forms of Echinoderms and their Significance

## **TEXT BOOKS**

Ayyar, Ekambaranatha M. and T.N. Ananthakrishnan. *Manual of Zoology. Vol.I, Part. I & II.* Madras: S.Viswanathan, 2003

Jordan, E. L. and P.S. Verma, *Invertebrate Zoology. Vol.I.* New Delhi: S.Chand, 2012.

## **BOOKS FOR REFERENCE**

Barnes, R. D. *Invertebrate Zoology.* Japan: Holt Saunders, 1982.

Bhamrah, H. S. and Kavita Juneja. *Recent Trends in Invertebrates. Vol.I – VIII.* New Delhi: Anmol, 1991.

Dhami, P. S. and J.K. Dhami. *Invertebrate Zoology.* NewDelhi: S.Chand, 1983.

Kotpal, R L., *Modern Textbook of Zoology Invertebrates.* New Delhi: Rastogi, 2011.

Majupuria, T.C. *Invertebrate Zoology.* New Delhi: S.Nagin, 1985.

Pechenik, Jan.A. *Biology of Invertebrates.* New York: McGraw-Hill, 2005.

Siebold, C. Th.u. *Anatomy of Invertebrate.* U.S.A: Hard Press, 2007.

## **JOURNALS**

Journal of Animal Science

Animal Science Journal

International Journal of Zoological Research

Invertebrate Survival Journal

## **WEB RESOURCES**

<http://www.sanctuaryasia.com>

[www.iaszoology.com](http://www.iaszoology.com)

<http://www.insects.org/>

<http://www.earthlife.net/begin.html>

## **PATTERN OF EVALUATION**

### **Continuous Assessment:**

**Total Marks: 50**

**Duration: 90 mins.**

Section A – 6 x 2 = 12 Marks (All questions to be answered)

Section B – 3 x 6 = 18 Marks (3 out of 5 to be answered)

Section C – 1 x 20 = 20 Marks (1 out of 2 to be answered)

### **Third Component:**

List of evaluation modes:

Quiz

Assignment

Drawing test/Assignment

Scrap book

### **End Semester Examination**

**Total Marks: 100**

**Duration: 3 hours**

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086**  
**B.Sc. DEGREE: BRANCH VIA. - ADVANCED ZOOLOGY AND**  
**BIOTECHNOLOGY**

**SYLLABUS**

(Effective from the academic year 2015 - 2016)

**INVERTEBRATA AND ECONOMIC ZOOLOGY PRACTICAL**

**CODE: 15ZL/MC/P112**

**CREDITS: 2**

**L T P: 0 0 3**

**TOTAL HOURS: 39**

**DISSECTIONS: *Periplaneta americana***

Digestive System

Nervous System

Male and Female Reproductive Systems

**COMPUTER SIMULATED DISSECTIONS**

Digital Earthworm

**MOUNTS**

Body setae of *Lampito mauritii*

Appendages of prawn - Demonstration

Mouth parts of mosquito, house fly and cockroach

**VERMICULTURE**

Study of life history stages of *Lampito mauritii* and *Perionyx excavatus*

Workshop on Vermitechnology

**SPOTTER**

**Invertebrata**

Identification and description of specimens of all groups of invertebrates studied under the syllabus

**Apiculture**

Structure and identification of different castes of *Apis indica*

Equipment needed for Apiculture

Slides –Mouthparts, Legs and Sting Apparatus of Honey Bee

Economic importance of honey -Testing the purity of honey

**Sericulture**

Structure, identification and life history stages of *Bombyx mori*

Tools and Equipment of Sericulture

Economic importance of silk worms

**Insect pests** –Any three pests

**Soil microarthropods** – Extraction using Berlese funnel

**Study of any ten Invertebrate fauna in the Stella Maris College Campus** (Observation of habit, habitat and adaptive features)

**Visit to Zoological Survey of India/Farm**

## **RECORD WORK**

Maintenance of a record of practical work done is essential for continuous assessment and is an integral part of the syllabus.

## **PATTERN OF EVALUATION**

### **CONTINUOUS ASSESSMENT**

Total Marks: 50

Duration: 3 hours

Question – I Dissection	20 marks
Question – II Mount and Diagram	8+2 marks
Question – III Spotters (Seven)	7x2 marks
Question –IV Identification of fauna in SMC (Three)	3x2 marks

### **END SEMESTER EXAMINATION:**

Total Marks: 50

Duration: 3 hours

Question – I Dissection	20 marks
Question – II Mount and Diagram	8+2 marks
Question – III Spotters (Seven)	7x2 marks
Question –IV Identification of fauna in SMC (Three)	3x2 marks

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086  
Allied Core Offered by the Department of Zoology to Students of Plant Biology and  
Plant Biotechnology

SYLLABUS  
(Effective from the academic year 2015 -2016)

GENERAL ZOOLOGY - I

CODE: 15ZL/AC/GZ14

CREDITS : 4

L T P : 4 0 0

TOTAL TEACHING HOURS: 52

OBJECTIVES OF THE COURSE

- To enable students to understand the structure and organisation of Invertebrates and Chordates
- To study their economic importance and aspects of conservation

**Unit 1** (10 hrs.)

- 1.1 Introduction: Outline Classification of Animal Kingdom
- 1.2 Protozoa – Characteristic Features: Type- *Paramecium caudatum*
- 1.3 Coelenterata - Characteristic Features: Corals and Coral Reefs – Conservation and Economic Importance
- 1.4 Aschelminthes – Characteristic Features: Type- *Ascaris lumbricoides*

**Unit 2** (11 hrs.)

- 2.1 Annelida: Characteristic Features: Type - *Lampito mauritii* – Vermitechnology
- 2.2 Arthropoda: Characteristic Features: Type- *Panurgus indicus* - Social Life in Insects
- 2.3 Mollusc: Characteristic Features – Economic Importance of Molluscs
- 2.4 Echinodermata: Characteristic Features: Type-*Asterias spp.*

**Unit 3** (9 hrs.)

- 3.1 Prochordata - Salient Features - Characteristic Features of Different Classes of the Phylum Chordata
- 3.2 Pisces: Characteristic Features – Parental Care and Migration in Fishes

**Unit 4** (10 hrs.)

- 4.1 Amphibia and Reptilia – Characteristic Features
- 4.2 Snakes of South India – Turtle Conservation
- 4.3 Aves: Characteristic Features – Types of Feathers - Flight Adaptations

**Unit 5** (12 hrs.)

- 5.1 Mammalia: Characteristic Features
- 5.2 Type: *Oryctolagus cuniculus*
- 5.3 Aquatic Mammals



### **TEXT BOOKS**

Ayyar, Ekambaranath, M. and T.N. Ananthkrishnan. *Manual of Zoology*. Vols. I & II Madras: S. Viswanathan, 2003.

### **BOOKS FOR REFERENCE**

Dhami, P. S. and Dhami J.K., *Invertebrate Zoology*. New Delhi: S. Chand, 2009.

Jordan, E.L. *Invertebrate Zoology*. New Delhi: S. Chand, 2012.

Jordan, E.L. and P.S. Verma. *Chordate Zoology*. New Delhi: S. Chand, 2013.

Kotpal, R.L. *Modern Textbook of Invertebrate*. New Delhi: Rastogi, 2011.

Majupuria, T. C. *Invertebrate Zoology*. New Delhi: S. Nagin, 1985.

Prasad, S. *Textbook of Vertebrate Zoology*. New Age International, 2012.

Thangamani, A, S. Prasanna Kumar, N. Arumugam and L.M. Narayanan. *A Textbook of Chordates*. Saras, 2013.

### **JOURNALS**

Journal of Animal Science

Open Journal of Animal Sciences

Animal Science Journal

### **WEB RESOURCES**

<http://www.sanctuaryasia.com>

[www.iaszoology.com](http://www.iaszoology.com)

<http://www.earthlife.net/begin.html>

### **PATTERN OF EVALUATION**

#### **Continuous Assessment:**

Total Marks: 50

Duration: 90 mins

Section A – 6 x 2 = 12 Marks (All questions to be answered)

Section B – 3 x 6 = 18 Marks (3 out of 5 to be answered)

Section C – 1 x 20 = 20 Marks (1 out of 2 to be answered)

#### **Third Component:**

List of evaluation modes:

Quiz

Assignments

Scrap book

Drawing Test/Assignment

#### **End Semester Examination**

Total Marks: 100

Duration: 3 hours

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086**  
**Allied Core Offered by the Department of Zoology to Students of Plant Biology**  
**and Plant Biotechnology**  
**SYLLABUS**

(Effective from the academic year 2015 - 2016)

**GENERAL ZOOLOGY I - PRACTICAL**

**CODE: 15ZL/AC/P111**

**CREDITS : 1**

**L T P : 0 0 2**

**TOTAL TEACHING HOURS: 26**

- 1. Dissections:**  
*Periplaneta americana* –  
Digestive system  
Nervous system
- 2. Mounts:** Mouth parts of cockroach and housefly  
Ctenoid Scale -Mullet  
Placoid Scales - Shark  
Cycloid Scale – Koi carp
- 3. Computer Simulated Dissections**  
Invertebrata: Earthworm  
Chordata: Frog
- 4. Identification and description of the following Invertebrates and Chordates**  
Protozoa : *Paramecium caudatum*  
Sponge : *Euplectella, Sycon*  
Coelenterata : *Hydra sp., Gorgonia sp., Meandrina sp., Metridium sp.*  
Aschelminthes: *Ascaris lumbricoides*  
Arthropoda : *Palamnaeus sp., Penaeus indicus*  
Mollusca : *Sepia, Ostrea sp., Pinctada sp.*  
Echinodermata: *Asterias sp., Holothuria sp.*  
Prochordata : *Amphioxus sp., Ascidia sp.*  
Pisces : *Scoliodon sp., Exocoetus sp.*  
Amphibia : *Bufo melanostictus, Ambystoma sp.*  
Reptilia : *Draco, Vipera russelli, Naja naja, Eryx sp.*  
Aves : Wood pecker, *Psitacula sp.*  
Mammalia : *Manis sp., Vesperugo sp.*

Identification of any five invertebrate and five chordate fauna in the SMC Campus

**Record Work**

Maintenance of a record of practical work done is essential for continuous assessment and is an integral part of the syllabus.

## **PATTERN OF EVALUATION**

### **CONTINUOUS ASSESSMENT**

Total Marks: 50

Duration: 3 Hours

Question – I	Major Question (Dissection)	20 marks
Question – II	Minor Question (Mount and Diagram)	15 marks
Question – III	Spotters (Five)	10 marks
Question – IV	Identification of fauna in Stella Maris College	5 marks

### **END SEMESTER EXAMINATION:**

Total Marks: 50

Duration: 3 Hours

Question – I	Major Question (Dissection)	20 marks
Question – II	Minor Question (Mount and Diagram)	15 marks
Question – III	Spotters (Five)	10 marks
Question – IV	Identification of fauna in Stella Maris College	5 marks

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B.Sc. DEGREE: BRANCH VI.A. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY

SYLLABUS  
(Effective from the academic year 2015 -2016)

CHORDATA

CODE: 15ZL/MC/CH24

CREDITS: 4

L T P: 4 0 0

TOTAL TEACHING HOURS: 52

OBJECTIVES OF THE COURSE

- To enable students to understand the organization of different groups of chordates
- To study the classification up to order level with suitable examples
- To appreciate the diversity and adaptability of chordates

- Unit 1** (11 hrs.)
- 1.1 Introduction –Outline Classification - Characteristic Features of the Phylum Chordata (Study of Endoskeleton to be restricted to Pigeon and Rabbit)
  - 1.2 Prochordates: Characteristic Features - Type: *Amphioxus* – Affinities – Retrogressive Metamorphosis In Urochordata
  - 1.3 Agnatha: Cyclostomata - Characteristic Features – Type: *Petromyzon*- Affinities
- Unit 2** (10 hrs.)
- 2.1 Pisces: Characteristic Features
  - 2.2 Type: *Scoliodon sorrakowah*
  - 2.3 Accessory Respiratory Organs - Parental Care - Electric Organs
- Unit 3** (9 hrs.)
- 3.1 Amphibia: Characteristic Features- Neoteny in Urodela - Parental Care in Amphibia
  - 3.2 Reptilia: Characteristic Features – Type: *Calotes versicolor* - Skull in Reptiles as Basis of Classification
  - 3.3 Snakes of South India – Poison Apparatus and Biting Mechanism
- Unit 4** (10 hrs.)
- 4.1 Aves: Characteristic Features – Type: *Columba livia*.
  - 4.2 Ratitae
  - 4.3 Flight Adaptations and Migration
- Unit 5** (12 hrs.)
- 5.1 Mammalia: Characteristic Features – Type: *Oryctolagus cuniculus*.
  - 5.2 Dentition in Mammals
  - 5.3 Aquatic Mammals

TEXT BOOKS

Ayyar, Ekambaranatha, M. *A Manual of Zoology. Vol. II* Chetpet: S. Viswanathan, 2003

Jordan, E.L. and Verma P.S., *Chordate Zoology*, New Delhi: S. Chand. 2013.

## BOOKS FOR REFERENCE

- Kotpal, R.L. *Modern Text Book of Zoology- Vertebrates*. Meerut: Rastogi Publications, 2014.
- Prasad,S. *Textbook of Vertebrate Zoology*. New Age International Ltd., 2012.
- McFarland, W.N., F. Harvey Pough, T.J.Code, and J.B. Heiser. *Vertebrate Life*. New York: Macmillan, 1979.
- Newman N.H. *The Phylum Chordata*. Agra: Satish Book Depot, 1981.
- Romer, A.S. and T.S. Parson. *The Vertebrate Body*. Philadelphia: Saunders College, 1986.
- Sedgewick A. *A Text Book of Zoology - Vol II & III*. Allahabad: Central Book Depot, 1960
- Thangamani,A, S.Prasanna Kumar, N.Arumugam and L.M.Narayanan. *A Textbook of Chordates*. Saras, 2013.
- Young. J.Z. *The Life of Vertebrates*. New York: Oxford University Press, 1978.

## JOURNALS

Journal of Animal Science  
Open Journal of Animal Sciences  
Animal Science Journal

## WEB RESOURCES

<http://www.sanctuaryasia.com>  
<http://www.mcwn.org/Animals/Animals.html>  
[animaldiversity.org](http://animaldiversity.org)  
[www.iaszoology.com](http://www.iaszoology.com)

## PATTERN OF EVALUATION

### Continuous Assessment:

**Total Marks: 50**

**Duration: 90 mins**

Section A – 6 x 2 = 12 Marks (All questions to be answered)

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Section C – 1 x 20 = 20 Marks (1 out of 2 to be answered)

### Third Component:

List of evaluation modes:

Seminars

Quiz

Assignments

Exhibition/Model Making

### End Semester Examination

**Total Marks: 100**

**Duration: 3 Hours**

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

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**SYLLABUS**

(Effective from the academic year 2015 - 2016)

**CHORDATA - PRACTICAL**

**CODE: 15ZL/MC/P221**

**CREDITS: 1**

**L T P: 0 0 2**

**TOTAL TEACHING HOURS: 26**

**1. DISSECTIONS**

**Fish:** Viscera and Digestive system

**2. MOUNTS**

Scales of fishes – Placoid-Shark  
Ctenoid- Mullet  
Cycloid –Koi Carp

**3. COMPUTER SIMULATED DISSECTION**

Frog – All systems

**4. SPOTTER**

Identification and description of specimens of all groups of chordates studied in the syllabus

**5. Study of any ten Chordate fauna in the Stella Maris College Campus**

**6. Field trip (Zoological park / Sanctuary/ Museum) – observation of chordates and compilation of a report**

**Record Work**

Maintenance of a record of practical work done and the observation of campus chordate fauna is essential for continuous assessment

**PATTERN OF EVALUATION**

**CONTINUOUS ASSESSMENT**

Total Marks: 50

Duration: 3 hours

Question – I	Major Question (Dissection)	20 marks
Question – II	Minor Question (Mount + Diagram)	15 marks
Question – III	Spotters (Five)	10 marks
Question – IV	Identification & description of any two fauna in Stella Maris College	5 marks

**END SEMESTER EXAMINATION:**

Total Marks: 50

Duration: 3 hours

Question – I	Major Question (Dissection)	20 marks
Question – II	Minor Question (Mount + Diagram)	15 marks
Question – III	Spotters (Five)	10 marks
Question – IV	Identification & description of any two fauna in Stella Maris College	5 marks

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086**  
**Allied Core Offered by the Department of Zoology to Students of Plant Biology and Plant Biotechnology**

**SYLLABUS**  
**(Effective from the academic year 2015 -2016)**

**GENERAL ZOOLOGY – II**

**CODE: 15ZL/AC/GZ24**

**CREDITS : 4**

**L T P : 4 0 0**

**TOTAL TEACHING HOURS: 52**

**OBJECTIVES OF THE COURSE**

- To learn basic concepts and current trends in Human Genetics and Developmental Biology
- To acquire a knowledge of economically important species and enable an understanding of the behaviour of animals

**Unit 1**

**Culture of Economically Important Species (10 hrs.)**

1.1 Introduction and Scope

1.2 Apiculture: Economically Important Species – Morphology and Social Organisation of *Apis indica* – Equipment and Tools needed to set up Apiary

1.3 Pisciculture : Culture of Indian Major Carp (*Catla catla*) – By-products of Fishing Industry

**Unit 2**

**Human Pathogens (10 hrs.)**

2.1 Introduction - Disease Cycle - Causative Organism, Mode of Transmission, Symptoms, Diagnosis and Control of the following diseases:

2.2 Viral: AIDS, Hepatitis

2.3 Bacterial: Tuberculosis, Cholera

2.4 Protozoan: Amoebiasis, Malaria

2.5 Helminth: Filariasis, Enterobiasis

**Unit 3**

**Developmental Biology (10 hrs.)**

3.1 Introduction - Gametogenesis - Types of Vertebrate Eggs

3.2 Cleavage - Blastulation and Gastrulation in Frog

3.3 Placentation in Mammals

3.4 Assisted Reproductive Technology – *In Vitro* Fertilization – Bioethical Issues

**Unit 4**

**Human Genetics (11 hrs.)**

4.1 Introduction – Human Chromosomes — Sex Determination in Human – Aneuploidy in Human

4.2 Multiple Allelic Inheritance: Eg. Human Blood Groups (A, B, AB and O), Rh factor, Inheritance and Significance – Polygenic Inheritance: Eg. Skin Colour in Man – Lethal Genes: Eg. Tay – Sach's Disease



4.3 Hereditary Diseases: Albinism, Huntington Disease, Haemophilia, Kearns, Sayre Syndrome and Lactose Intolerance – Genetic Counselling

**Unit 5**

**Animal Behaviour**

**(11 hrs.)**

5.1 Introduction- Shelter Seeking and Construction

5.2 Animal Associations: Symbiosis, Commensalism, Mutualism, Parasitism and Predation

5.3 Behaviour and Reproduction: Courtship Behaviour – Parental Care

5.4 Learning Behaviour: Forms of Learning

5.5 Abnormal Behaviour in Domestic and Zoo Animals

**BOOKS FOR REFERENCE**

Agarwal, V.K. *Animal Behaviour*. New Delhi: S.Chand, 2009.

Ahsan, J and S.R. Sinha, *A Hand book on Economic Zoology*. New Delhi: S.Chand, 2009.

Cummings, R Michael. *Human Heredity – Principles and issues*. Canada: Thomson Brooks/Cole, 2003.

Dubey, R.C. and Maheshwari, D.K. *A Text Book of Microbiology*. New Delhi: S.Chand, 2013.

Mathur, Reena. *Animal Behaviour*. Meerut: Rastogi, 2014.

Rastogi, V. B. and M.S. Jayaraj, *Development Biology*. Meerut: Kedarnath Ramnath, 2011.

Shukla, G. S. and V.B. Upadhyay, *Economic Zoology*, Meerut: Rastogi, 2013.

Subramanian, T. *Molecular Developmental Biology*, New Delhi: Narosa, 2011.

William, S. Klug, Michael R. Cummings and Charlotte Spencer. *Concepts of Genetics*. New Jersey: Pearson Education, 2012.

**JOURNALS**

The Journal of Basic and Applied Zoology

Journal of Infectious Diseases and Therapy

BMC Medical Genomics

Genomics & Quantitative Genetics

International Journal of Zoological Research

**WEB RESOURCES**

[www.omim.org](http://www.omim.org)

<http://www.globalhealth.gov>

**PATTERN OF EVALUATION**

**Continuous Assessment:**

**Total Marks: 50**

**Duration: 90 mins.**

Section A – 6 x 2 = 12 Marks (All questions to be answered)

Section B – 3 x 6 = 18 Marks (3 out of 5 to be answered)

Section C – 1 x 20 = 20 Marks (1 out of 2 to be answered)

**Third Component:**

List of evaluation modes:

Quiz

Pedigree Construction

Assignments

Problem solving/Case studies

**End Semester Examination****Total Marks: 100****Duration: 3 hours**

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086**  
**Allied Core Offered by the Department of Zoology to Students of Plant Biology and**  
**Plant Biotechnology**

**SYLLABUS**

(Effective from the academic year 2015 - 2016)

**GENERAL ZOOLOGY II - PRACTICAL**

**CODE: 15ZL/AC/P221**

**CREDITS: 1**

**L T P: 0 0 2**

**TOTAL TEACHING HOURS: 26**

- 1. APICULTURE**  
Structure and Identification of Different Castes of *Apis indica*  
Equipments Needed for Apiculture  
Slides –Mouthparts and Legs of Honey Bee  
Economic Importance of Honey – Testing the Quality of Honey
- 2. FOOD FISHES**  
*Catla catla* - *Mugil cephalus* - *Sardinella longiceps* – *Rastralliger kanagurta* –  
*Notopteruss sp.*
- 3. GENETICS**  
ABO - Blood Grouping  
Rh – Typing
- 4. DEVELOPMENTAL BIOLOGY**  
Observation of Different Kinds of Vertebrate Eggs: Frog and Chick .  
Study of Prepared Slides: Cleavage, Blastulation and Gastrulation Stages of Frog.  
Placenta: Sheep and Pig
- 5. ANIMAL ASSOCIATIONS**  
Parasitism: Identification of *Entamoeba histolytica*, *Taenia solium*, *Ancylostoma duodenale*, *Wuchereria bancrofti*, *Hirudinaria granulosa*, *Sacculina* on Crab  
Mutualism: Sea Anemone on Hermit Crab  
Commensalism: *Echeneis*

**RECORD WORK**

Maintenance of a record of practical work done is essential for continuous assessment and is an integral part of the syllabus.

**PATTERN OF EVALUATION**

**CONTINUOUS ASSESSMENT**

Total Marks: 50

Duration: 3 Hours

Question – I ABO/Rh Typing

15 marks

Question – II Spotters (Seven)

35 marks

**END SEMESTER EXAMINATION:**

Total Marks: 50

Duration: 3 Hours

Question – I ABO/Rh Typing

15 marks

Question – II Spotters (Seven)

35 marks

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086**  
**B.Sc. DEGREE: BRANCH VI.A. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY**

**SYLLABUS**  
**(Effective from the academic year 2015 -2016)**

**DEVELOPMENTAL BIOLOGY**

**CODE: 15ZL/MC/DB34**

**CREDITS : 4**

**L T P : 4 0 0**

**TOTAL TEACHING HOURS: 52**

**OBJECTIVES OF THE COURSE**

- To enable students to understand the fundamental aspects and phases of animal development
- To acquaint students with recent advances in the field of Developmental Biology and Bioethical issues

**Unit 1 (10 hrs.)**

- 1.1 Introduction - Brief History - Theories of Preformation, Epigenesis, Pangenesis, Recapitulation, Germplasm, Mosaic and Regulative, Gradient and Organisers
- 1.2 Metamorphosis in Insects and Amphibians
- 1.3 Regeneration - Mechanism and Types – Medical Applications

**Unit 2 (11 hrs.)**

- 2.1 Gametogenesis: Spermatogenesis - Morphology and Types of sperms Oogenesis - Eggs – Morphology, Types and Membranes
- 2.2 Fertilization: Physicochemical Aspects – Theories - Parthenogenesis
- 2.3 Embryonic Adaptations: Extra - Embryonic and Foetal Membranes - Types and Functions of Placenta

**Unit 3 (10 hrs.)**

- 3.1 Cleavage: Patterns –Blastulation in Frog and Chick
- 3.2 Gastrulation: General Morphogenetic Movements in Chordate Embryos – Comparative Study of Gastrulation in Frog and Chick
- 3.3 Cell-Lineage, Fate Maps and their Significance

**Unit 4 (10 hrs.)**

- 4.1 Organogenesis: Ectodermal Derivatives – Brain and Sense Organs (Eye and Ear)
- 4.2 Mesodermal Derivatives: Heart and Blood
- 4.3 Endodermal Derivatives: Digestive Tract and its Derivatives

**Unit 5 (11 hrs.)**

- 5.1 Assisted Reproductive Technology: Induced Ovulation and its Applications – *In vitro* Fertilisation - Surrogate Motherhood - Freezing Human Embryos - Grafts and Transplants – Cloned Babies
- 5.2 Ethical Issues Relating to Assisted Reproductive Technology

## **TEXT BOOKS**

Rastogi, V.B. and M.S. Jayaraj. *Developmental Biology*. Meerut: Kedarnath Ramnath, 2014.

Verma, P.S. and V.K Agarwal. *Chordate Embryology*. New Delhi: S. Chand, 2014.

## **BOOKS FOR REFERENCE**

Balinsky, B.I. *An Introduction to Embryology*. Japan: Holt-Saunders, 2012.

Biroc, Sandra Lyn. *Developmental Biology*. New York: Macmillan, 1986.

Browder, L.W. *Developmental Biology*. New York: Holt-Rinehart and Winston, 1980.

Gilbert, Scott F. *Developmental Biology*. Massachusetts: Sinauer Associates, Inc. 2013.

Kiessling, A and C. Anderson. *Human Embryonic Stem Cells – An Introduction to the Science and Therapeutic Potential*. New York: Jones and Barlett Saunders, 1982.

Starr, Cecie and Ralph Taggart. *Biology: The Unity and diversity of life*. New York: Wadsworth, 1992.

Warren, John. *Developmental Biology*. New York and Canada: Macmillan, 2003.

Wolpert, L. *Principles of Development*. London: University Press, 2006.

## **JOURNALS**

International Journal of Developmental Biology

Journal of Developmental Biology

Frontiers in Cell and Developmental Biology

Stem Cell Research

## **WEB RESOURCES**

<http://www.visembryo.com/baby/index.html>

<http://www.sdbonline.org/>

## **PATTERN OF EVALUATION**

### **Continuous Assessment:**

**Total Marks: 50**

**Duration: 90 mins.**

Section A – 6 x 2 = 12 Marks (All questions to be answered)

Section B – 3 x 6 = 18 Marks (3 out of 5 to be answered)

Section C – 1 x 20 = 20 Marks (1 out of 2 to be answered)

### **Third Component:**

List of evaluation modes:

Seminars/Presentation

Quiz

Assignments

Mini Project

Scrap Book

### **End Semester Examination**

**Total Marks: 100**

**Duration: 3 Hours**

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086**  
**B.Sc. DEGREE: BRANCH V.I.A. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY**

**SYLLABUS**  
**(Effective from the academic year 2015 -2016)**

**VERTEBRATE PHYSIOLOGY**

**CODE: 15ZL/MC/VP34**

**CREDITS : 4**

**L T P : 4 0 0**

**TOTAL TEACHING HOURS: 52**

**OBJECTIVES OF THE COURSE**

- To study the functioning of organs and organ systems
- To acquire a scientific foundation relevant to the field of medicine and other related professions

**Unit 1 (9 hrs.)**

- 1.1 Introduction - Digestive System: Physiology of Digestion and Absorption in Human
- 1.2 Respiratory System: Physiology of Respiration in Human - Oxygen Transport - Dissociation Curve - CO<sub>2</sub> Transport - Chloride Shift
- 1.3 Adaptations to Diving and High Altitudes

**Unit 2 (10 hrs.)**

- 2.1 Circulatory System: Physiology of Circulation in Human - Regulation of Heart Beat and Blood Pressure – Electrocardiogram(Principle and Application)
- 2.2 Lymph: Composition, Circulation and Functions
- 2.3 Thermoregulatory Mechanisms in Vertebrates

**Unit 3 (10 hrs.)**

- 3.1 Osmoregulatory Mechanisms in Vertebrates
- 3.2 Formation of Nitrogenous Wastes: Ammonotelism, Uricotelism and Ureotelism
- 3.3 Excretory System: Physiology and Regulation of Excretion in Human.

**Unit 4 (12 hrs.)**

- 4.1 Types of Muscles - Ultrastructure of the Striated Muscle - Properties of Muscles - Muscle Contraction - Theories
- 4.2 Neurons: Structure and Types - Conduction of Nerve Impulse
- 4.3 Reflex Action
- 4.4 Autonomic Nervous System - E.E.G. (Principle and Application)

**Unit 5 (11 hrs.)**

- 5.1 Structure and Physiology of Male and Female Reproductive System of Mammal
- 5.2 Endocrine Glands of Human – Mechanism of action of Steroid and Peptide Hormones Action.
- 5.3 Structure, Function and Regulation of Pituitary, Thyroid, Parathyroid, Pancreas and Adrenal glands
- 5.4 Physiology of Ageing – Causes and Theories

## **TEXT BOOK**

Verma P.S., V.K. Agarwal, & B.S. Tyagi. *Animal Physiology*. New Delhi: S. Chand, 1980.

## **BOOKS FOR REFERENCE**

Clark, Robert K. *Anatomy and Physiology – Understanding the human body*. New Delhi: Jones and Bartlett India, 2010.

Guyton, A.C. *Text Book of Medical Physiology*. Philadelphia: W.B. 1991.

Hole J. W. *Essentials of Human Anatomy & Physiology*. Wim. C. Brown, 1992.

Johnson, Leonard, R. *Essential Medical Physiology*. U.S.A: Academic Press, 2006.

Lauralee Sherwood. *Human Physiology – From cells to Systems*. USA: Wadsworth, 1997.

Lauralee Sherwood, Hillar Klandorf and Paul Yancey. *Textbook of Animal Physiology*. New Delhi: Cengage Learning India, 2011.

Solomon, Eldra, P. Diana, W. Martin and Linda Berg. *Biology*. U.S.A: Thomson Books, 2005.

Stuart Ira Fox. *Human Physiology*. New York: McGraw Hill, 2011.

## **JOURNALS**

Journal of Physiology

Indian Journal of Physiology

Extreme Physiology and Medicine

## **WEB RESOURCES**

[www.physiologyweb.com](http://www.physiologyweb.com)

[www.getbodysmart.com](http://www.getbodysmart.com)

## **PATTERN OF EVALUATION**

### **Continuous Assessment:**

**Total Marks: 50**

**Duration: 90 mins.**

Section A – 6 x 2 = 12 Marks (All questions to be answered)

Section B – 3 x 6 = 18 Marks (3 out of 5 to be answered)

Section C – 1 x 20 = 20 Marks (1 out of 2 to be answered)

### **Third Component:**

List of evaluation modes:

Exhibits / Models

Seminars

Quiz

Assignments

### **End Semester Examination**

**Total Marks: 100**

**Duration: 3 hours**

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086**  
**B.Sc. DEGREE: BRANCH VIA. - ADVANCED ZOOLOGY AND**  
**BIOTECHNOLOGY**  
**SYLLABUS**

(Effective from the academic year 2015 - 2016)

**PHYSIOLOGY AND DEVELOPMENTAL BIOLOGY - PRACTICAL**

**CODE: 15ZL/MC/P332**

**CREDITS: 2**

**L T P: 0 0 3**

**TOTAL HOURS: 39**

**PHYSIOLOGY**

1. Oxygen consumption in an aquatic animal with reference to body weight.
2. Detection of nitrogenous waste products, qualitative estimation of Ammonia, (fish) Uric acid (bird excreta) and Urea (mammalian kidney)
3. Determination of amylase activity in relation to high temperature, low temperature and room temperature
4. Assessing digestion of proteins, carbohydrates and fats using Physio Ex 8.0
5. Study of frog cardiovascular physiology using Physio Ex 8.0.

**Demonstration:**

Estimation of Na and K content in food samples – Flame Photometer

**DEVELOPMENTAL BIOLOGY**

1. Examination of prepared slides of testis and ovary of a mammal.
2. Examination of different kinds of vertebrate eggs ( frog, reptile and bird ).
3. Examination of prepared slides of mammalian sperm and graffiaan follicle.
4. Study of prepared slides of blastulation and gastrulation stages of Frog.
5. Observation and examination of prepared slides (whole mounts) of 18, 24, 33, 48, 72 and 96 hours chick.
6. Study of organogenesis using prepared slides with reference to the development of brain, heart, eye and ear of frog.
7. Identification of placenta of shark, sheep and pig.
8. Observation: - Life cycle of frog

**RECORD WORK**

Maintenance of a record of practical work done is essential for continuous assessment and is an integral part of the syllabus.

**PATTERN OF EVALUATION**

**CONTINUOUS ASSESSMENT**

Total Marks: 50

Duration: 3 hours

Question – I Major Question 25 marks

Question – II Minor Question 15 marks

Question – III Spotters (Four) 10 marks

**END SEMESTER EXAMINATION:**

Total Marks: 50

Duration: 3 hours

Question – I Major Question 25 marks

Question – II Minor Question 15 marks

Question – III Spotters (Four) 10 marks



**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086**  
**B.Sc. DEGREE: BRANCH VI.A. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY**

**SYLLABUS**  
**(Effective from the academic year 2015 -2016)**

**MICROBIOLOGY**

**CODE: 15ZL/MC/MB44**

**CREDITS : 4**

**L T P : 4 0 0**

**TOTAL TEACHING HOURS: 52**

**OBJECTIVES OF THE COURSE**

- To have an overview of microbial techniques and study the functional morphology, growth and reproduction of bacteria and viruses
- To acquire a fundamental knowledge of microbial diseases and their control.
- To understand the role of microbes in everyday life

**Unit 1 (10 hrs.)**

- 1.1 Introduction: History and Scope of Microbiology
- 1.2 Outline Classification of Microorganisms with Special Reference to Bacteria and Viruses - Characteristic Features of Prokaryotes and Eukaryotes
- 1.3 Microbiological Techniques: Microscopy, Specimen Preparation and Staining Techniques - Media Preparation and Types of Culture Media – Preservation of Culture – Pure Culture Techniques

**Unit 2 (10 hrs.)**

- 2.1 Viruses: General Properties – Isolation and Cultivation of Viruses - Structure and Reproduction of T<sub>4</sub> Phage – Structure and Multiplication of an Animal Virus – Subviral Particles (Viroids and Prions)
- 2.2 Archaea – Characteristics (Brief Outline)
- 2.3 Bacteria: Gross Morphology of Bacterial Cells - Size, Shape and Arrangement- Structure of a Bacterium - Cell Wall, Chemical Composition and Characteristics of Gram Positive and Gram Negative Bacteria – Molecular Structure of Nucleoid – Types and Functions of Plasmids
- 2.4 Bacterial Growth: Reproduction and Growth of Bacterial Population - Growth Curve – Measurement of Microbial Growth

**Unit 3 (10 hrs.)**

- 3.1 Physical Conditions Required for Growth of Bacteria : Temperature, Oxygen and pH Requirements - Nutritional Requirements - General Nutritional Classification of Bacteria
- 3.2 Recombination in Bacteria: Transformation, Conjugation and Transduction
- 3.3 Microbial Control: Importance of Microbial Control - Control of Micro-Organisms by Physical and Chemical Agents – Antibiotics and Their Mechanisms of Action

**Unit 4 (11 hrs.)**

- 4.1 The Normal Micro-Biota of the Human Body: Skin, Mouth and Oropharynx, Stomach, Small Intestine, Large Intestine, Vagina and Urethra (Brief Study)

- 4.2 Disease Cycle of a Communicable Disease- The Epidemiology of Infectious Diseases: Airborne (Influenza, Pneumonia and Measles)- Food and Water Borne (Typhoid, Cholera and Polio) – Nosocomial and Fomite Borne – Infection Through Body Fluids (Hepatitis B and Ebola) - Sexually Transmitted Diseases (Genital Herpes, Gonorrhoea and Syphilis)
- 4.3 Zoonotic (Swine Flu, Dengue Fever and Leptospirosis)

**Unit 5 (11 hrs.)**

- 5.1 Food: Sources and Types of Microorganisms In Milk – Pasteurization of Milk - Dairy Products (Fermented Milk and Cheese) - Spoilage of Food and its Control – Fermented Food – Food Poisoning - Probiotics
- 5.2 Microbial Damage of Materials: Natural Fabrics, Paper and Cosmetics
- 5.3 Soil Microbiology: Role of Micro-organisms in Soil Fertility – Nitrogen Cycle - Sulfur Cycle

**TEXT BOOK**

Dubey, R.C. and Maheshwari. D.K. *A Text Book of Microbiology*. New Delhi: S.Chand, 2013.

**BOOKS FOR REFERENCE**

- Berguist L.M., and P. Barbara. *Microbiology – Principles and Health Science Applications*. Philadelphia:W.B. Saunders Company, 2002.
- Baumam, Robert.W. *Microbiology*. San Francisco: Pearson Benjamin Cummings, 2006.
- Harvey, Richard, A. Pamela. C. Champe and Bruce D. Fisher, *Microbiology*. U.S.A: Lippincott William and Wilkins, 2007.
- Madigan T. Michael and John M Martinko. *Brook Biology of Microorganisms*. U.S.A: Pearson Prentice Hall, 2005.
- Nester, Eugene, W., Denise G Anderson, Roberts C. Evans and Martha T Nester. *Microbiology – A Human Perspective*. New York: Mc Graw Hill, 2005.
- Pelczar, Michael J. and E.C.S. Chan. *Elements of Microbiology*. New Delhi: McGraw Hill International Book Company, 1981.
- Pommerville, Jeffrey C. *Alcamo’s Fundamentals of Microbiology*. U.S.A: Jones and Bartlett, 2004.
- Prescott, L.M., J.P. Harley, and D.A. Klein. *Microbiology*. New York: McGraw Hill, 2005.
- Tortora, Gerard, J., Berdelle R. Funk and Christine L Case. *Microbiology – An Introduction*. San Francisco: Pearson - Benjamin Cummings, 2007.

**JOURNALS**

- Journal of Bacteriology  
International Journal of Microbiology  
Journal of Applied Microbiology  
Journal of Microbiology, Biotechnology and Food Sciences

## **WEB SOURCES**

<http://archives.microbeworld.org/microbes/>  
<http://www.textbookofbacteriology.net/index.html>  
<http://www.bioedonline.org/>  
[www.asm.org](http://www.asm.org)

## **PATTERN OF EVALUATION**

### **Continuous Assessment:**

**Total Marks: 50**

**Duration: 90 mins.**

Section A – 6 x 2 = 12 Marks (All questions to be answered)

Section B – 3 x 6 = 18 Marks (3 out of 5 to be answered)

Section C – 1 x 20 = 20 Marks (1 out of 2 to be answered)

### **Third Component:**

#### **List of Evaluation Modes:**

Seminars

Quiz

Assignments

Case studies

Exhibition

Poster making

### **End Semester Examination**

**Total Marks: 100**

**Duration: 3 hours**

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086**

**B.Sc. DEGREE: BRANCH VIA. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY**

**SYLLABUS**

(Effective from the academic year 2015 - 2016)

**MICROBIOLOGY - PRACTICAL**

**CODE: 15ZL/MC/P442**

**CREDITS: 2**

**L T P: 0 0 3**

**TOTAL TEACHING HOURS: 39**

1. Identification of Microbes – Prepared Specimens
2. Instruments Used in Microbiology Laboratory – Microscope, Incubator, Hot Air Oven, Autoclave and Laminar Flow
3. Observation of Bacterial Motility – Hanging Drop Preparation
4. Preparation of Nutrient Agar and MacConkey Agar
5. Isolation of Bacteria by Pure Culture - Streak Plate
6. Examination of Soil Bacteria using Pour Plate Method
7. Coliform Count in Drinking Water Samples by Membrane Filter Technique
8. Gram Staining and Examination of Bacteria
9. Spoilage of Food Items viz., Milk - Bread - Fruits and Vegetables – (Observation)
10. Examination of Milk - Methylene Blue Reduction Test
11. Winogradsky Column – Observation of Bacterial Diversity
12. Antibiotic Sensitivity Test - Kirby Bauer Diffusion Method – (Observation)
13. Collection and Classification of Antibiotics Based on their Biological Origin, Mode of Action and their Applications

**RECORD WORK**

Maintenance of a record of practical work done is essential for continuous assessment and is an integral part of the syllabus

**PATTERN OF EVALUATION**

**CONTINUOUS ASSESSMENT**

Total Marks: 50

Duration: 3 hours

Question – I	Major Question	25 marks
Question – II	Minor Question	15 marks
Question – III	Spotters (Four)	10 marks

**END SEMESTER EXAMINATION:**

Total Marks: 50

Duration: 3 hours

Question – I	Major Question	25 marks
Question – II	Minor Question	15 marks
Question – III	Spotters (Four)	10 marks

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086**  
**B.Sc. DEGREE: BRANCH VI.A. - ADVANCED ZOOLOGY AND**  
**BIOTECHNOLOGY**

**SYLLABUS**  
**(Effective from the academic year 2015 -2016)**

**INTRODUCTION TO HUMAN PHYSIOLOGY & IMMUNOLOGY**

**CODE: 15ZL/AE/HI45**

**CREDITS : 5**

**L T P : 4 1 0**

**TOTAL TEACHING HOURS: 65**

**OBJECTIVES OF THE COURSE**

- To understand the functioning of various systems in the human body
- To acquaint students with some common diseases and diagnostic tests
- To learn the basic concepts of Immunology

**Unit 1 (13 hrs.)**

Introduction – Outline of Human Anatomy (Integumentary, Skeletal, Muscles, Digestive, Respiratory, Circulatory, Excretory, Nervous, Endocrine and Reproductive Systems – A brief study)

**Unit 2 (13 hrs.)**

- 2.1 Respiratory System: Respiratory Pigment - Oxygen Transport - CO<sub>2</sub> Transport – Asthma and Chronic Obstructive Pulmonary Disease (COPD)
- 2.2 Circulatory System: Heart - Structure and Function, Regulation of Heart Beat and Blood Pressure – Heart Attack and Hypertension – Electro Cardio Gram and Angiogram
- 2.3 Excretory System: Structure of Nephron – Physiology and Regulation of Excretion – Kidney Stones, Kidney Failure and Dialysis

**Unit 3 (13 hrs.)**

- 3.1 Endocrine System : Endocrine Organs in human
- 3.2 Structure, Function and Regulation of Pituitary, Thyroid, Parathyroid, Pancreas, Adrenal Glands and Gonads
- 3.3 Physiology of Ageing

**Unit 4 (13 hrs.)**

- 4.1 Introduction to Immune System – Cells and Tissues of Immune System
- 4.2 Primary and Secondary Lymphoid Organs
- 4.3 Types of Immunity: Natural, Acquired, Humoral and Cell Mediated Immunity

**Unit 5 (13 hrs.)**

- 5.1 Immunoglobulins – Structure, Types and Characteristics
- 5.2 Antigen – Antibody Reactions
- 5.3 Hypersensitive Reactions – Allergy and Anaphylactic Shock – Grave's Disease
- 5.4 Principles and Types of Vaccines – Vaccination Schedule

## BOOKS FOR REFERENCE

- Coico, R., G. Sunshine and E. Benjamin. *Immunology*. John Wiley, 2013.
- Fatima, D and N. Arumugam. *Immunology*. Saras, 2013.
- Gangal, S. and S. Sontakke. *Textbook of Basic and Clinical Immunology*. Orient Blackswan, 2013.
- Goldsby, R.A., Thomas J. Kindt and Barbara A. Osborne. *Kuby Immunology*. New York: W.H. Freeman and Company, 2006.
- Guyton, A.C. *Text Book of Medical Physiology*. London: W.B. Saunders & Co., Philadelphia, 1991.
- Hole, J. W. *Essentials of Human Anatomy and Physiology*. Wim C. Brown, 1992.
- Sherwood, Lauralee. *Human Physiology – From cells to Systems*. USA: Wadsworth, 1997.
- Solomon, Eldra P., Diana W. Martin and Linda Berg. *Biology*. U.S.A: Thomson Books, 2005.
- Stuart Ira Fox. *Human Physiology*. New York: McGraw Hill Companies, 2011.

## JOURNALS

Journal of Physiology  
Indian Journal of Physiology  
The Journal of Immunology  
Open Journal of Immunology

## WEB SOURCES

[www.innerbody.com](http://www.innerbody.com)  
[www.getbodysmart.com](http://www.getbodysmart.com)  
[www.immunologylink.com](http://www.immunologylink.com)

## PATTERN OF EVALUATION

### Continuous Assessment:

**Total Marks: 50**

**Duration: 90 mins.**

Section A –  $6 \times 2 = 12$  Marks (All questions to be answered)

Section B –  $3 \times 6 = 18$  Marks (3 out of 5 to be answered)

Section C –  $1 \times 20 = 20$  Marks (1 out of 2 to be answered)

### Third Component:

List of evaluation modes:

Quiz

Assignment

Poster Making

Data collection and interpretation

### End Semester Examination

**Total Marks: 100**

**Duration: 3 hours.**

Section A –  $10 \times 3 = 30$  Marks (All questions to be answered)

Section B –  $5 \times 6 = 30$  Marks (5 out of 7 to be answered)

Section C –  $2 \times 20 = 40$  Marks (2 out of 4 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086  
B.Sc. DEGREE: BRANCH V.I.A. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY

SYLLABUS  
(Effective from the academic year 2015 -2016)

GENETICS

CODE: 15ZL/MC/GN54

CREDITS: 4

L T P: 4 0 0

TOTAL TEACHING HOURS: 52

OBJECTIVES OF THE COURSE

- To study the rules of inheritance in cells, individuals and population
- To understand the genetic mechanism of growth and development of an organism

**Unit 1** (11 hrs.)

- 1.1 Introduction: Mendel and his Experiments - Law of Dominance, Law of Segregation and Law of Independent Assortment - Back Cross / Test Cross
- 1.2 Interaction of Genes : Incomplete Dominance – Co dominance - Lethal Genes - Epistasis – (Dominant and Recessive) - Penetrance and Expressivity
- 1.3 Extra Chromosomal Inheritance : Cytoplasmic Inheritance (Plastid Inheritance in *Mirabilis jalapa*) - Maternal Influence (Shell Coiling in *Limnaea*) – Mitochondrial Inheritance (Kearns - Sayre Syndrome)

**Unit 2** (10 hrs.)

- 2.1 Multiple Gene Inheritance: Characteristics – Eg. Skin Colour in Man - Transgressive Variation (Weight in Chicken)
- 2.2 Multiple Alleles: Characteristics – Eg. Human Blood Groups (A, B, AB, O,) - Rh Factor - Inheritance and Significance
- 2.3 Linkage and Crossing Over: Complete and Incomplete Linkage in *Drosophila* - Cytological Proof of Crossing Over, Eg. *Drosophila* – Linkage Mapping

**Unit 3** (10 hrs.)

- 3.1 Sex Determination: Chromosomal Mechanisms of Sex Determination - Sex Determination in *Drosophila* - Sex Determination in Human - Barr Body - Importance of Y Chromosome - Male Haploidy - Environmental Factors Affecting Sex Determination
- 3.2 Sex Linkage: *Drosophila*, Eye Colour – Man, Haemophilia - Incomplete Sex Linkage - Y- Linked Genes - Sex Influenced and Sex Limited Genes in Man

**Unit 4** (11 hrs.)

- 4.1 Mutations: Different Types. Point Mutations, Molecular Basis - Mutagens
- 4.2 Chromosomal Aberrations - Numerical Variations
- 4.3 Animal Breeding: Inbreeding, Outbreeding and Hybrid Vigour



**Unit 5****(10 hrs.)**

- 5.1 Inborn Errors of Metabolism - Genetic Counselling
- 5.2 Population Genetics: Gene Pool and Gene Frequency, Hardy - Weinberg Law and Factors Influencing Allele Frequency
- 5.3 Genetic Regulation of Development in *Drosophila*: Developmental Stages – Three Major Classes of Developmental Genes (Maternal Effect Genes, Segmentation Genes and Homeotic Genes)

**TEXT BOOKS**

Verma P.S. & V.K. Agarwal. *Genetics*. New Delhi: S. Chand, 2009.

**BOOKS FOR REFERENCE**

Benjamin A. Pierce. *Genetics – A conceptual approach*. New York: W. H. Freeman, 2008.

Goldsby, R.A., Thomas J. Kindt, Barbara Osborne. *Kuby's Immunology*. New York: W.H. Freeman, 2006.

Harti, Daniel L. *Essential Genetics*. USA: Jones & Bartlett Learning, 2013.

Klug, William, S., Michael Cummings and Charlotte Spencer. *Concepts of Genetics*. New Jersey: Pearson Education, 2012.

Michael R. Cummings. *Human Heredity – Principles and issues*. Canada: Thomson Brooks/Cole, 2003.

Russel, Peter J.I. *Genetics – A molecular approach*. San Francisco: Benjamin Cummings, 2011.

Snustand, Peter D. and Michael J. Simmons. *Principles of Genetics*. New York: John Wiley, 2012.

Winchester, A.M. *Genetics*. Calcutta: Oxford & IBH, 1974.

**JOURNALS**

Journal of Genetics

Journal of Human Genetics

BMC Medical Genomics

Genomics & Quantitative Genetics

**WEB RESOURCES**

[ghr.nlm.nih.gov](http://ghr.nlm.nih.gov)

[www.ncbs.res.in](http://www.ncbs.res.in)

[www.omim.org](http://www.omim.org)

[learn.genetics.utah.edu](http://learn.genetics.utah.edu)

## **PATTERN OF EVALUATION**

### **Continuous Assessment:**

**Total Marks: 50**

**Duration: 90 mins.**

Section A – 6 x 2 = 12 Marks (All questions to be answered)

Section B – 3 x 6 = 18 Marks (3 out of 5 to be answered)

Section C – 1 x 20 = 20 Marks (1 out of 2 to be answered)

### **Third Component:**

List of evaluation modes:

Quiz

Problem solving

Group projects

Pedigree construction and analysis

Data collection and interpretation

### **End Semester Examination**

**Total Marks: 100**

**Duration: 3 hours**

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086**  
**B.Sc. DEGREE: BRANCH V.I.A. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY**

**SYLLABUS**  
**(Effective from the academic year 2015 -2016)**

**CELL AND MOLECULAR BIOLOGY**

**CODE: 15ZL/MC/CM54**

**CREDITS: 4**

**L T P : 4 0 0**

**TOTAL TEACHING HOURS: 52**

**OBJECTIVE OF THE COURSE**

- To understand the structure and function of various cellular organelles and macromolecules at biochemical and molecular level

**Unit 1 (9 hrs.)**

- 1.1 Introduction – Prokaryotic and Eukaryotic Cells
- 1.2 Origin of Eukaryotic Cells – Endosymbiont Theory
- 1.3 Cell Membrane: Structural Organization, Asymmetry and Fluidity, Specializations in Structure; Transport Across Membranes
- 1.4 Cytoplasmic Vacuolar System: Endoplasmic Reticulum and Golgi Apparatus

**Unit 2 (10 hrs.)**

- 2.1 Lysosomes: Structure, Polymorphism, Functions and Diseases
- 2.2 Mitochondria: Structure and Functions
- 2.3 Ribosomes: Structure, Types, Functions
- 2.4 Nuclear Organization

**Unit 3 (10 hrs.)**

- 3.1 Chromosomes – Structure, Types and Functions
- 3.2 Cell Cycle: Regulation of Cell Cycle - Cell Death
- 3.3 Cancer Biology: Characteristics of a Cancer Cell – Altered Cell Cycle in Cancer Cell- Genetic Basis

**Unit 4 (10 hrs.)**

- 4.1 Nucleic Acids : DNA - Molecular Structure, Replication and Repair Mechanisms - RNA: Types and Functions
- 4.2 DNA Sequencing: Sanger Method and Applications
- 4.3 The Human Genome Project and its Significance

**Unit 5 (13 hrs.)**

- 5.1 Structural Organization of Prokaryotic and Eukaryotic Genes
- 5.2 Regulation of Gene Expression in Bacteria – Lac Operon Model
- 5.3 Transcription: Biosynthesis of Various RNAs – Transcription Factors – Post Transcriptional Modifications
- 5.4 Mechanism of Translation: Genetic Code - Post Translational Modifications in Collagen and Insulin

## **TEXT BOOK**

Rastogi, S.C. *Cell and Molecular Biology*. New Age International, 2006.

## **BOOKS FOR REFERENCE**

Alberts, Bruce, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts and Peter Walter. *Molecular Biology of the Cell*. New York: Garland, 2008.

Cooper, Geoffrey.M and Robert. E. Hausman. *Cell – A Molecular Approach*. Sinauer Associates, 2004.

Karp, Gerald. *Cell Biology*. USA: John Wiley, 2010.

Karp, Gerald. *Cell and Molecular Biology: Concepts and Experiments*. New Jersey: John Wiley, 2010.

Lodish, Harvey, David Baltimore and Arnold Bert. *Molecular Cell Biology*. New York: W.H. Freeman, 2007.

.Rastogi, V B. *Introductory Cytology*. Meerut: Kedarnath Ramnath,2015.

Watson, J.D., Tania A Baker, Stephen P. Bell, Alexander Gann, Michael Levin and Richard Losick. *Molecular Biology of the Gene*. California: The Benjamin Cummings, 2007.

Wolfe, Stephen I. *An Introduction to Cell and Molecular Biology*. California: Wadsworth, 1995.

## **JOURNALS**

Journal of Cell and Molecular Biology

Journal of Molecular Cell Biology

## **WEB RESOURCES**

[www.cellbio.com](http://www.cellbio.com)

<http://www.ibiblio.org/virtualcell/index.htm>

<http://www.biozone.co.nz/>

## **PATTERN OF EVALUATION**

### **Continuous Assessment:**

**Total Marks: 50**

**Duration: 90 mins.**

Section A – 6 x 2 = 12 (All questions to be answered)

Section B – 3 x 6 = 18 (3 out of 5 to be answered)

Section C – 1 x 20 = 20 (1 out of 2 to be answered)

### **Third Component:**

List of evaluation modes:

Quiz

Assignments

Models / Posters

### **End Semester Examination**

**Total Marks: 100**

**Duration: 3 Hours**

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086**  
**B.Sc. DEGREE: BRANCH V.I.A. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY**

**SYLLABUS**  
**(Effective from the academic year 2015 -2016)**

**FUNDAMENTALS OF BIOTECHNOLOGY**

**CODE: 15ZL/MC/FB54**

**CREDITS : 4**

**L T P: 4 0 0**

**TOTAL TEACHING HOURS: 52**

**OBJECTIVES OF THE COURSE**

- To understand the basic concepts of Biotechnology in general and Genetic engineering in particular
- To learn the principles, tools of Biotechnology

**Unit 1 (10 hrs.)**

- 1.1 Definition and Areas of Biotechnology
- 1.2 Tools of Genetic Engineering: Enzymes, Recombinant DNA Technology, Passenger DNA, Cloning Vectors - cDNA Library - Gene Bank
- 1.3 Electrophoresis, Northern, Southern and Western Blots - PCR Technique

**Unit 2 (12 hrs.)**

- 2.1 Cloning in Prokaryotes and Eukaryotes
- 2.2 Methods of Transfer of Foreign DNA into Cells: Electroporation, Particle Bombardment Gun, Ultrasonication, Liposome-Mediated Transfer and Microinjection
- 2.3 Site - Directed Mutagenesis

**Unit 3 (10 hrs.)**

- 3.1 Gene Cloning in Medicine: Insulin and Somatotropin
- 3.2 Diagnosis and Treatment: DNA Probe, ELISA Technique, Hybridoma Technology, Vaccines, DNA Finger Printing and Gene Therapy
- 3.3 Genetically Modified Organisms (Microorganisms, Plants and Animals)
- 3.4 Benefits and Hazards of Genetic Engineering

**Unit 4 (10 hrs.)**

- 4.1 Animal Cell and Tissue Culture Techniques – Culture Media – Natural and Artificial – Primary and Secondary Cell Lines – Culture Methods – Merits and Demerits
- 4.2 Stem Cell Culture: Applications and Ethical Issues

**Unit 5 (10 hrs.)**

- 5.1 Basic Concept of Bioinformatics: Proteomics and Genomics
- 5.2 Enzyme Technology: Production, Immobilisation and Application

## **TEXT BOOK**

Dubey, R.C. *A Text Book of Biotechnology*. New Delhi: S.Chand, 2005.

## **BOOKS FOR REFERENCE**

Lohar, Prakash S. *Biotechnology*. India: MJP, 2005.

McCabe, L.L. and E.R.B. McCabe. *DNA: Promise & Peril*. USA: University of California Press, 2010.

McGiffen, Steven P. *Biotechnology*. USA: Pluto Press, 2005.

Mahesh, S. *Biotechnology IV*. India: New Age International, 2006.

Nicholl, Desmond, S.T. *An Introduction to Genetic Engineering*. UK: Cambridge University Press, 2002.

Sathyanarayana, U. *Biotechnology*. Books and Allied, 2008.

Ying, S. *Generation of cDNA libraries – Methods & Protocols*. Humana Press, 2003.

Young, Lisa. *Biotechnology and Genetic Engineering*. Facts on Files, 2004.

## **JOURNAL**

Journal of Biotechnology

The Scitech Journal

Indian Journal of Biotechnology

BMC Medical Genomics

## **WEB RESOURCES**

<http://www.ncbi.nlm.nih.gov/>

<http://www.hhmi.org/biointeractive>

[www.genengnews.com](http://www.genengnews.com)

## **PATTERN OF EVALUATION**

### **Continuous Assessment:**

**Total Marks: 50**

**Duration: 90 mins.**

Section A –  $6 \times 2 = 12$  Marks (All questions to be answered)

Section B –  $3 \times 6 = 18$  Marks (3 out of 5 to be answered)

Section C –  $1 \times 20 = 20$  Marks (1 out of 2 to be answered)

### **Third Component:**

List of evaluation modes:

Seminars

Quiz

Assignments

Scrap book

### **End Semester Examination**

**Total Marks: 100**

**Duration: 3 hours**

Section A –  $10 \times 3 = 30$  Marks (All questions to be answered)

Section B –  $5 \times 6 = 30$  Marks (5 out of 7 to be answered)

Section C –  $2 \times 20 = 40$  Marks (2 out of 4 to be answered)

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086**

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**SYLLABUS**

(Effective from the academic year 2015 - 2016)

**CELL AND MOLECULAR BIOLOGY, GENETICS AND BIOTECHNOLOGY - PRACTICAL**

**CODE: 15ZL/MC/P553**

**CREDITS: 3**

**L T P: 0 0 6**

**TOTAL TEACHING HOURS: 78**

**CELL AND MOLECULAR BIOLOGY**

Camera lucida

Micrometry

RBC Count

WBC Count

Mitosis - in onion root tip

Meiosis - in grasshopper testis

*Chironomus* - Salivary gland chromosome - squash preparation

Genomic DNA extraction

Total RNA extraction

**GENETICS**

*Drosophila* culture techniques

*Drosophila* mutants

Squamous epithelium squash preparation – Barr body

ABO Blood Grouping - Pedigree Analysis

Rh Typing

Slides / Plates of normal, Turner, Klinefelter and Down's Syndrome, Karyotypes-Observation

Study of any five Mendelian Traits

Hardy -Weinberg Equilibrium – Calculating Gene Frequency and Genotypic Frequency using bead experiments

**BIOTECHNOLOGY**

Isolation of Plasmid DNA – Demonstration and Group practical

Agarose Gel Electrophoresis

SDS-PAGE - Demonstration

Polymerase Chain Reaction – Demonstration and group practical

Observation of Adherent and Suspension Culture

**Visit to a Molecular Biology/Biotechnology Laboratory**

## **RECORD WORK**

Maintenance of a record of practical work done is essential for continuous assessment and is an integral part of the syllabus.

## **PATTERN OF EVALUATION**

### **CONTINUOUS ASSESSMENT:**

Total Marks: 50

Duration: 3 hours

Question – I	Major Question	20 marks
Question – II	Minor Question –Mount (10) Diagram (5)	15 marks
Question – III	Spotters (Six)	15 marks

### **END SEMESTER EXAMINATION:**

Total Marks: 50

Duration: 3 hours

Question – I	Major Question	20 marks
Question – II	Minor Question -Mount (10) Diagram (5)	15 marks
Question – III	Spotters (Six)	15 marks



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**SYLLABUS**

**(Effective from the academic year 2015 -2016)**

**CONSERVATION BIOLOGY**

**CODE: 15ZL/ME/CB55**

**CREDITS : 5**

**L T P : 4 1 0**

**TOTAL TEACHING HRS. : 65**

**OBJECTIVES OF THE COURSE**

- To create an awareness regarding threats to existing Biodiversity
- To emphasize a need for conservation of Biodiversity

**Unit 1**

**Biological Diversity (12 hrs.)**

- 1.1 Introduction – Concept of Species – Species Richness, Evenness and Diversity
- 1.2 Geographical and Ecological Factors Affecting Distribution of Biodiversity-  
Latitudinal Gradient – Theories; Measurement of Species Number – Species Area  
Relationship - Endemism
- 1.3 Biodiversity and Community – Metapopulations – Source and Sink Concept
- 1.4 Valuing Biological Diversity

**Unit 2**

**Threats to Biodiversity (14 hrs.)**

- 2.1 Loss of Biodiversity: Causes – Natural and Anthropogenic; Habitat Loss,  
Degradation and Fragmentation, Pollution, Disease, Overexploitation, Wildlife  
Trade, Overabundance, Invasive Species, Global Climate Change
- 2.2 Extinction – Extinction over Geological Time and Anthropogenic Extinctions –  
Extinction Rate
- 2.3 Monitoring Biodiversity
- 2.4 Human-Wildlife Conflicts – Causes – Mitigation – Case Studies

**Unit 3**

**Conservation (14 hrs.)**

- 3.1 A Historical Perspective
- 3.2 Conservation – Characteristics; Approaches – Community Based – Fortress  
Approach; Socio-Economic Aspects - Community Based Conservation – Case  
Studies; Conservation Movements
- 3.3 Island Biogeographic Theory and Conservation Practice – Designing Biosphere  
Reserves – Single Large or Several Small (SLOSS)
- 3.4 Conservation Strategies - *In Situ*: National Parks, Marine Parks, Wildlife Sanctuaries,  
Biosphere Reserves, Sacred Groves, Community Reserves and Wildlife Corridors -  
Global Hotspots – Ecoregions – Urban Wildlife Conservation
- 3.5 Conservation Strategies – *Ex Situ*: Zoos, Gene Banks - Captive Breeding and  
Reintroductions - Molecular Approach To Conservation - Single Species  
Conservation: Pros and Cons – Keystone Species, Umbrella Species, Indicator  
Species and Flagship Species

**Unit 4**

**Conservation Laws, Organizations and Ecotourism (13 hrs.)**

- 4.1 Forest Conservation Act (1980), Wildlife Protection Act, (1972) and its Amendments, Earth Summit at Rio De Janeiro, Convention On Biological Diversity (CBD), Biodiversity Act (2002), CITES, Intellectual Property Rights (IPRS) and Protection (IPP)
- 4.2 Role of IUCN - Red Data Book – MAB - Role of Institutions in Conservation- Ramsar Convention for Wetland Conservation
- 4.3 Government Agencies and Conservation - NGOs and Conservation – Case Studies – Indian Conservation Biologists – Forging a National Strategy
- 4.4 Ecotourism

**Unit 5**

**(12 hrs.)**

**Ecosystem Management and Restoration Ecology**

- 5.1 Ecosystem Stress
- 5.2 Ecosystem Management – Managing Forests – Managing Aquatic Ecosystems
- 5.3 Case Studies in Conservation Management
- 5.4 Restoring Damaged Ecosystems – Monitoring Restoration Programs
- 5.5 Traditional Ecological Management Practices - Preservation of Indigenous Knowledge
- 5.6 Sustainable Development – Challenges in the Future

**TEXT BOOK**

Maiti, Prabodh K. and Paulami Maiti. *Biodiversity: Perception, Peril and Preservation*. PHI Learning, 2011.

**BOOKS FOR REFERENCE**

Greipse, Sigurdur. *Restoration Ecology*. Jones and Bartlett Learning, 2011.

Groom, Martha.J., Gary.K. Meffe and Ronald. C. Carroll. *Principles of Conservation Biology*. Sinauer Associates, 2006.

Honey Martha. *Ecotourism and Sustainable Development*. Island Press, 1999.

MacDonald, David and Katrina Service. *Key Topics in Conservation Biology*. Blackwell, 2007.

MacZulak, Anne. *Biodiversity: Conserving Endangered Species*. Infobase, 2010.

Rosenzweig, Michel.L. *Win-Win Ecology – How the earth's species can survive in the midst of human enterprise*. Oxford University, 2003.

Swanson, Timothy.M. *Intellectual Property Rights and Biodiversity Conservation*. Cambridge University, 1995.

Wearing, Stephen and Neil, John. *Ecotourism: Impacts, Potentials and Possibilities*. Elsevier, 2009.

## **JOURNALS**

Conservation Biology  
Asian Journal of Conservation Biology  
Animal Biodiversity and Conservation

## **WEB RESOURCES**

[www.conbio.org](http://www.conbio.org)  
[www.conservationindia.org](http://www.conservationindia.org)  
<http://www.sanctuaryasia.com>

## **PATTERN OF EVALUATION**

### **Continuous Assessment:**

**Total Marks: 50**

**Duration: 90 mins.**

Section A – 6 x 2 = 12 Marks (All questions to be answered)

Section B – 3 x 6 = 18 Marks (3 out of 5 to be answered)

Section C – 1 x 20 = 20 Marks (1 out of 2 to be answered)

### **Third Component:**

List of evaluation modes:

Presentations

Open book test

Exhibits

Conservation Activity

### **End Semester Examination**

**Total Marks: 100**

**Duration: 3 hours.**

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086  
B.Sc. DEGREE: BRANCH VI.A. - ADVANCED ZOOLOGY AND  
BIOTECHNOLOGY

**SYLLABUS**

(Effective from the academic year 2015 - 2016)

**ENVIRONMENTAL BIOTECHNOLOGY**

**CODE: 15ZL/ME/EB55**

**CREDITS: 5**

**L T P: 4 1 0**

**TOTAL TEACHING HOURS: 65**

**OBJECTIVES OF THE COURSE**

- To apply principles of biotechnology to environmental problems and issues
- To create an awareness of current technologies employed in environmental sustainability

**Unit 1**

**Environmental Monitoring (13 hrs.)**

- 1.1 Introduction – Need for Monitoring
- 1.2 Sampling and Analysis – Air, Soil and Water
- 1.3 Determination of Biodegradable Organic Material - Monitoring Pollution
- 1.4 Toxicity Testing Using Biological Material - Bio indicators, Biomarkers and Biosensors

**Unit 2**

**Bioremediation (14 hrs.)**

- 2.1 Introduction : Synthetic Compounds – Petrochemical Compounds and Inorganic Wastes in The Environment (A Brief Outline)
- 2.2 Bioremediation Strategies: Phytoremediation, Metal and Gaseous Bioremediation – Bioaugmentation – Genetically Modified Organisms
- 2.3 Bioremediation Techniques (*In-Situ* and *Ex-Situ*)
- 2.4 Case Studies : Exxon Valdez Oil Spill, Acidic Mine Drainage in Yellowstone National Park

**Unit 3**

**Waste Treatment (15 hrs.)**

- 3.1 Sewage Treatment Methods : STP - Sludge Treatment and Disposal; Anaerobic Digestion
- 3.2 Treatment of Agricultural Wastes - Removal of Nitrogen and Phosphorus
- 3.3 Treatment of Industrial Effluents: ETP - Distillery, Dairy, Tannery, Textile and Sugar Industries

**Unit 4**

**Towards Sustainable Development (12 hrs.)**

- 4.1 Biofertilizers in an Agro Ecosystem
- 4.2 Biopesticides: Types and Mode of Action
- 4.3 Production and Applications of Biofuels: Biogas, Biodiesel, Ethanol, Hydrogen

**Unit 5**

**Resource Recovery (11 hrs.)**

- 5.1 Introduction – Need for Recovery of Resources
- 5.2 Oil Recovery: Enhanced Oil Recovery and Microbially Enhanced Oil Recovery
- 5.3 Bioleaching: Extraction of Copper, Uranium and Gold

## BOOKS FOR REFERENCE

- Evans, Gareth, M. and Judith C. Furlong. *Environmental Biotechnology: Theory and Applications*. Wiley – VCH, 2002.
- Hans – Joachim Jordening and Joseph Winter. *Environmental Biotechnology: Concepts and Applications*. Wiley – VCH, 2005.
- Maier Raina. M., Ian L Pepper and Charles.P.Gerba. *Environmental Microbiology*. Elsevier, 2009.
- Mishra, C. S. K and Asha A. Juarkar, *Environmental Biotechnology*. P. H. Corporation, 2007.
- Mohapatra, Pradipta Kumar. *Textbook of Environmental Biotechnology*. I.K.International, 2006.
- Nester, Eugene. W., Anderson, Denise. J., Roberts, Evans. C. Jr., Nancy.N Pearsall and Martha T. Nester. *Microbiology*. Mc Graw Hill Higher Education, 2008.
- Rastogi, S.C. and Shivani Rastogi. *Introduction to Biotechnology*. CBS, 2006.
- Scragg, Alan. *Environmental Biotechnology*. New York: Oxford University Press, 2007.
- Thakur Indu Shekhar. *Environmental Biotechnology – Basic Concepts and Applications*. I.K International, 2006.
- Thieman, Bill and Michael Palladino. *Introduction to Biotechnology*. Pearson Benjamin Cummings, 2010.

## JOURNALS

- Journal of Environmental Biotechnology  
International Journal of Environmental Biotechnology  
Microbial Ecology and Environmental Biotechnology

## WEB RESOURCES

- <http://www.environmentalbiotechnology.org/>  
<http://www.biodesing.asu.edu>

## PATTERN OF EVALUATION

### Continuous Assessment:

**Total Marks: 50**

**Duration: 90 mins.**

Section A –  $6 \times 2 = 12$  Marks (All questions to be answered)

Section B –  $3 \times 6 = 18$  Marks (3 out of 5 to be answered)

Section C –  $1 \times 20 = 20$  Marks (1 out of 2 to be answered)

### Third Component:

List of evaluation modes:

Seminars

Quiz

Assignments

Case studies

Project

### End Semester Examination

**Total Marks: 100**

**Duration: 3 hours**

Section A –  $10 \times 3 = 30$  Marks (All questions to be answered)

Section B –  $5 \times 6 = 30$  Marks (5 out of 7 to be answered)

Section C –  $2 \times 20 = 40$  Marks (2 out of 4 to be answered)

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086**  
**B.Sc. DEGREE: BRANCH VI.A. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY**

**SYLLABUS**  
**(Effective from the academic year 2015 -2016)**

**MEDICAL LABORATORY TECHNOLOGY**  
(Skill development course)

**CODE: 15ZL/ME/LT55**

**CREDITS : 5**

**L T P : 4 0 1**

**TOTAL TEACHING HOURS: 65**

**OBJECTIVES OF THE COURSE**

- To learn the foundations of clinical theory and practice
- To develop specific skills in Laboratory Techniques

**Unit 1**

**Introduction**

**(11 hrs.)**

- 1.1 Good Lab Practices (GLP)
- 1.2 Sterilisation of Laboratory Items - Preparation of Reagents - Preparation of R.B.C & W.B.C. Fluids, Normal Saline and Leishman's Stain
- 1.3 Venous and Capillary Blood Collection Techniques - Anticoagulants - Modes of Action and Uses
- 1.4 Biomedical Wastes: Classification, Characteristics and Potential Health Hazards, Biomedical Waste Management: Rules and Regulations

**Unit 2**

**Haematology**

**(14 hrs.)**

- 2.1 Red Blood Corpuscle: Structure (Normal & Abnormal) - Erythropoiesis - Total Count - Packed Cell Volume - Wintrobe's and Microhaematocrit Techniques - Total Reticulocyte Count - Erythrocyte Sedimentation Rate: Westergren's Method - Haemoglobin Estimation: Sahli's and Drabkin's Methods - Estimation of Haemoglobin By Drabkin's Method (Practicals) - Different Types of Anaemia - Polycythemia
- 2.2 White Blood Corpuscle: Leucopoiesis - Total W.B.C Count - Preparation of Blood Smear For Differential Count - Different Types of W.B.C - Leucocytosis - Leucopenia, Leukemia
- 2.3 Blood Platelets - Platelet Counting

**Unit 3**

**Transfusion and Coagulation**

**(13 hrs.)**

- 3.1 Immunohaematological Studies - Blood Groups and Rh-Types
- 3.2 Transfusion of Blood and Blood Components - Tests For Compatibility
- 3.3 Blood Coagulation: Process and Theory - Bleeding Time - Clotting Time - Prothrombin Time

**Unit 4**

**Pathology**

**(14 hrs.)**

- 4.1 Urine: Macroscopic, Microscopic and Chemical Analysis

- 4.2 Examination of Blood Smear for Malarial Parasites and Microfilariae – Motion Analysis for Common Protozoan and Helminthic Intestinal Parasites
- 4.3 Analysis of Cerebrospinal Fluid - Seminal Fluid
- 4.4 Mode of Infection, Pathological Changes and Symptoms of Acquired Immuno Deficiency Syndrome (AIDS), Hepatitis and Tuberculosis (TB)

## **Unit 5**

### **Clinical Tests**

**(13 hrs.)**

- 5.1 Blood Glucose and Blood Urea – Ranges in Health and Disease and Interpretation Estimation of Glucose (Practical)
- 5.2 Total Serum Cholesterol Estimation - Ranges in Health and Disease and Interpretation - Estimation of Serum Cholesterol (Practical)
- 5.3 Physiology and Biochemistry of the Serum Enzymes – Aspartate Transaminase (AST) and Alanine Transaminase (ALT)
- 5.4 Laboratory Pregnancy Tests

### **BOOKS FOR REFERENCE**

- Baker, F.J., R.E. Silverton, and C.J. Pallister. *Baker and Silverton's Introduction to Medical Laboratory Technology*. Hodder Arnold, 2001.
- Bauer, J.D. *Clinical Laboratory Methods*. New Delhi: B.I. 1990.
- Estridge, B.H., A.P. Reynolds, and N.J. Walters. *Basic Medical Laboratory Techniques*. Africa and Australia: Delmar Thomas Learning, 2002.
- Guyton, A.C. and Hall. *A Text Book of Medical Physiology*. USA: Saunders Elsevier, 2010.
- McPherson R.A and M. R Pincus. *Henry's Clinical Diagnosis and Management by Laboratory Methods*. Philadelphia: W.B. Saunders, 2011.
- Ramakrishnan, S and K.N Sulochana. *Manual of Medical Laboratory Techniques*. Jaypee Brothers Medical, 2012.
- Raphael, S.S. *Lynch's Medical Laboratory Technology*. Philadelphia: W.B. Saunders Co., 1983.
- Sood, R. *Textbook of Medical Laboratory Technology*. New Delhi: Jaypee Brothers Medical, 2006.

### **JOURNALS**

- Journal of Clinical Laboratory Analysis
- American Journal of Medical Technology
- Journal of Medical Science and Technology

### **WEB RESOURCES**

- [www.csmls.org](http://www.csmls.org)
- <http://www.nlm.nih.gov/medlineplus>

## **PATTERN OF EVALUATION**

### **Continuous Assessment:**

**Total Marks: 50**

**Duration: 90 mins.**

Section A –  $6 \times 2 = 12$  (All questions to be answered)

Section B –  $3 \times 6 = 18$  (3 out of 5 to be answered)

Section C –  $1 \times 20 = 20$  (1 out of 2 to be answered)

### **Third Component:**

List of evaluation modes:

Seminars

Quiz

Case studies

### **END SEMESTER EXAMINATION:**

**Total Marks: 100**

**Duration: 3 hours**

Section A –  $10 \times 3 = 30$  Marks (All questions to be answered)

Section B –  $5 \times 6 = 30$  Marks (5 out of 7 to be answered)

Section C –  $2 \times 20 = 40$  Marks (2 out of 4 to be answered)



**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086**  
**B.Sc. DEGREE: BRANCH VIA. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY**  
**(Effective from the academic year 2015 -2016)**

**PROJECT**

**CODE: 15ZL/ME/PR55**

**CREDITS : 5**

**L T P : 0 0 5**

**TOTAL TEACHING HOURS: 65**

**OBJECTIVES OF THE COURSE**

- To enable students to carry out an independent study on a topic of their choice
- To create a spirit of scientific inquiry among students

**Criteria for Selection of Candidates**

- The student should have research aptitude
- The student should possess good analytical skills, computer skills, good writing skills and the ability to interpret and discuss scientific data
- An eligibility test will be conducted

**Guidelines**

- Each student will present a list of topics in the area of her interest
- One of the topics will be approved by the Supervisor
- The project work will require
  - Practical work
  - Submission of project report
  - Viva-voce
- Project report should be submitted at the end of the semester on the stipulated date.

**Evaluation**

Continuous Assessment – 50 marks

End semester evaluation of project work and viva-voce-50 marks

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086**  
**B.Sc. DEGREE: BRANCH V.I.A. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY**

**SYLLABUS**  
**(Effective from the academic year 2015 -2016)**

**ANIMAL BEHAVIOUR**

**CODE: 15ZL/MC/AB64**

**CREDITS : 4**

**L T P : 4 0 0**

**TOTAL TEACHING HOURS: 52**

**OBJECTIVES OF THE COURSE**

- To acquaint student with different aspects of animal behaviour
- To encourage students to make observations and carry out projects on behaviour using concepts and methods taught

**Unit 1 (10 hrs.)**

- 1.1 Introduction: Behaviour - Causes and Significance - Ethology – History
- 1.2 Concepts and Terms - Motivation - Fixed Action Pattern (FAP) - Sign Stimulus - Innate Releasing Mechanism (IRM) - Action Specific Energy (ASE) - Concept of Behavioural Genetics
- 1.3 Methods of Studying Behaviour: Studies in Laboratories - Studies in the Wild - Observation – Identification and Location of Individuals - Describing - Recording and Cataloguing - Interpreting and Presenting Data

**Unit 2 (11 hrs.)**

- 2.1 Basic and Maintenance Behaviour: Rhythms - Sleep - Maintenance and Related Behaviour - Foraging and Caching - Shelter Seeking and Construction
- 2.2 Finding a Place to Live: Habitat Selection and Territory – Homing - Chronobiology

**Unit 3 (10 hrs.)**

- 3.1 Sociobiology: Communication - Methods of Study - Modes and Mechanisms: Chemical, Auditory, Tactile, Visual and Electrical - Social Organisation in Primates.
- 3.2 Behaviour and Reproduction: Breeding Patterns - Courtship

**Unit 4 (10 hrs.)**

- 4.1 Interspecific Behaviour: Aggregations, Commensalism, Mutualism, Parasitism and Predation
- 4.2 Play: General Attributes of Play - Examples / Descriptions of Play Behaviour - Theories

**Unit 5 (11 hrs.)**

- 5.1 Internal Control of Behaviour: Brain, Neurochemicals & Neurotransmitters and Behaviour, Hormones and Behaviour, Psychoactive Drugs and Human Behaviour
- 5.2 Sensory Worlds and Animal Learning - Different Forms of Learning
- 5.3 Abnormal Behaviour in Human Beings - Neurotic Disorder, (Anxiety Disorder). Eg. Phobic Disorder and Obsessive - Compulsive Disorder - Psychotic Disorder Eg. Schizophrenia

## **TEXT BOOK**

Mathur, Reena. *Animal Behaviour*. Meerut: Rastogi, 2014.

## **BOOKS FOR REFERENCE**

Alcock, John. *Animal Behaviour - An Evolutionary Approach*. Massachusetts: Sinauer Associates, 2013.

Grier, James, W. *Biology of Animal Behaviour*. Missouri: Times Mirror / Mosby College Publishing, 1992.

Kalat, James W. *Introduction to Psychology*. U.S.A: Brooks / Cole Publishing Company, 1996.

Mandal, Fatik Baran. *A Text Book of Animal Behaviour*. PHI Learning, 2010.

Manning, Aubrey and Marian Stamp Dawkins. *An Introduction to Animal Behaviour*. Cambridge University, 2012.

Raven, Peter H. and George B. Johnson. *Understanding Biology*. St. Louis: Mosby Year Book, 1995.

Scott, G. *Essential Animal Behaviour*. USA: Blackwell, 2005.

Slater, P.J.B. *An Introduction to Ethology*. Cambridge University Press, 1989.

## **JOURNALS**

The British Journal of Animal Behaviour

Journal of Ethology

## **WEB RESOURCES**

[www.animalbehaviorsociety.org](http://www.animalbehaviorsociety.org)

<http://www.sanctuaryasia.com>

## **PATTERN OF EVALUATION**

### **Continuous Assessment:**

**Total Marks: 50**

**Duration: 90 Mins**

Section A – 6 x 2 = 12 (All questions to be answered)

Section B – 3 x 6 = 18 (3 out of 5 to be answered)

Section C – 1 x 20 = 20 (1 out of 2 to be answered)

### **Third Component:**

List of evaluation modes:

Quiz

Project

Poster/Presentation

## **End Semester Examination**

**Total Marks: 100**

**Duration: 3 Hours**

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086**  
**B.Sc. DEGREE: BRANCH V.I.A. - ADVANCED ZOOLOGY AND BIOTECHNOLOGY**

**SYLLABUS**  
**(Effective from the academic year 2015 -2016)**

**ECOLOGY AND EVOLUTION**

**CODE: 15ZL/MC/EE64**

**CREDITS : 4**

**L T P : 4 0 0**

**TOTAL TEACHING HOURS: 52**

**OBJECTIVES OF THE COURSE**

- To provide an overview of the limiting factors governing the ecosystem
- To study the working of biological systems and physical systems
- To acquire an understanding of the evolutionary process, evidences and theories

**Unit 1 (9 hrs.)**

- 1.1 Introduction to Ecology-Autecology and Synecology - Soil Formation – Texture – Profile – Classifications - Properties
- 1.2 Abiotic Factors: Temperature - Thermal Stratification, Range of Temperature Tolerance, Light - Composition, Light on Land and Water- Biological Effects of Light on Aquatic and Terrestrial Organisms- Role of pH
- 1.3 Attributes of Population – Density – Natality – Mortality - Age Distribution

**Unit 2 (12 hrs.)**

- 2.1 Habitat Ecology: Terrestrial Habitat: Biomes, Tundra, Grassland, Forest (Coniferous, Tropical, Temperate and Deciduous) - Ecotones
- 2.2 Deserts: Fauna, Adaptations of Animals Inhabiting Deserts and Caves
- 2.3 Fresh Water Ecology: Physico-Chemical Nature of Freshwater - Biotic Communities – Lotic-Lentic Lakes (Oligotrophic and Eutropic) - Ponds and Rivers - Pulicat Lake
- 2.4 Marine Ecology: Physico-Chemical Characteristics - Biotic Communities of Pelagic and Benthic Zone
- 2.5 Estuarine Systems : Physico-Chemical Characteristics - Biotic Communities

**Unit 3 (11 hrs.)**

- 3.1 Introduction - Origin of Life
- 3.2 Geological Time Scale - Fossilisation - Dating of Fossils - Indian Fossils - Living Fossils
- 3.3 Theories of Evolution: Lamarckism, Neo-Lamarckism, Darwinism, Neo-Darwinism, Modern Synthetic Theory of Natural Selection, Mutation Theory of De Vries
- 3.4 Convergent and Divergent Evolution – Adaptive Radiations

**Unit 4 (10 hrs.)**

- 4.1 Genetic Variation in Populations: Gene Frequency, Genetic Drift, Genetic Polymorphism and Selection - Hapmap Project
- 4.2 Species Concept – Speciation: Allopatric and Sympatric - Subspecies - Sibling Species - Isolation in Speciation

4.3 Molecular Evolution: Advantages of Molecular Data over Morphological Data – C Value Paradox - Reconstruction of Evolutionary Trees

**Unit 5** (10 hrs.)

5.1 Mimicry and Colouration - Co-Evolution

5.2 Distribution of Animals: Types, Barriers and Methods of Dispersal of Animals - Zoogeographical Realms of the World

5.3 Evolution of Horse and Significance - Evolution of Man – Biological, Racial and Cultural History

5.4 Human Influence over Human Evolution and Other Species

**TEXT BOOKS**

Gopalakrishnan, T.S., Itta Sambasiviah, and A.P. Kamalakara Rao. *Principles of Organic Evolution*. Madras: Pearl Publications, 1995.

Rastogi, Veer Bala and M.S.Jayaraj. *Animal Ecology and distribution of animals*. Meerut: Kedar Nath Ram Nath, 1998.

**BOOKS FOR REFERENCE**

Cain, Michael et al. *Ecology*. U.S.A: Sinauer Associates Inc., 2011.

Colbert, E.H. *Evolution of the Vertebrates*. New Delhi: Wiley Eastern, 1961.

Darwin, Charles. *The Origin of Species*. London: John Murray, 1909.

Dodson, E.O. *Evolution Process and Product*. New York: Reinhold, 1960.

Dobzhansky, T. *Evolution, Genetics and Man*. New York: John Wiley, 1964.

Futuyma, D. J. *Evolution*. U.S.A: Sinauer Associates, 2005.

Graur, Dan and Wen Hsiung Li. *Fundamentals of Molecular Evolution*. U.S.A: Sinauer Associates, 2000.

Hall B. K. and Hallgrímsson. *Strickberger's Evolution*. New Delhi: Jones and Bartlett, 2014.

Li, W.H. *Molecular Evolution*. U.S.A: Sinauer Associates, 1997.

Mayr, E. *Animal Species and Evolution*. Harvard University, 1963.

McKinney, Michael. L. et al. *Environmental Science - Systems and solutions*. Jones and Bartlett Learning, 2006.

Moody, P.A. *Introduction to Evolution*. New York: Harper, 1978.

Pilbeam, D.R. *The Evolution of Man*. London: Thames and Hudson, 1970.

**JOURNALS**

International Journal for Ecology and Development

Journal of Evolutionary Biology

## **WEB RESOURCES**

[www.ecology.com](http://www.ecology.com)

<http://ncse.com/evolution>

<http://www.nhptv.org/natureworks/nw4.htm>

## **PATTERN OF EVALUATION**

### **Continuous Assessment:**

**Total Marks: 50**

**Duration: 90 mins.**

Section A –  $6 \times 2 = 12$  Marks (All questions to be answered)

Section B –  $3 \times 6 = 18$  Marks (3 out of 5 to be answered)

Section C –  $1 \times 20 = 20$  Marks (1 out of 2 to be answered)

### **Third Component:**

List of evaluation modes:

Seminars

Quiz

Assignments

Problem solving

Presentation

### **End Semester Examination**

**Total Marks: 100**

**Duration: 3 hours**

Section A –  $10 \times 3 = 30$  Marks (All questions to be answered)

Section B –  $5 \times 6 = 30$  Marks (5 out of 7 to be answered)

Section C –  $2 \times 20 = 40$  Marks (2 out of 4 to be answered)

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**SYLLABUS**  
**(Effective from the academic year 2015 -2016)**

**IMMUNOLOGY**

**CODE: 15ZL/MC/IM64**

**CREDITS : 4**

**L T P : 4 0 0**

**TOTAL TEACHING HOURS: 52**

**OBJECTIVES OF THE COURSE**

- To study the basic concepts and organisation of the immune system
- To acquire an understanding of the mammalian immune response

**Unit 1**

**Organisation of Immune System and Basic Concepts of Immunity (10 hrs.)**

- 1.1 Introduction - History and Basics of Immunology
- 1.2 Cells and Molecules of the Immune System: Types, Source and Salient Functions
- 1.3 Primary and Secondary Lymphoid Tissues / Organs
- 1.4 Types of Immunity: Cellular and Humoral Immunity - Natural and Acquired Immunity - Active and Passive Immunity with Examples

**Unit 2**

**Antigens and Antibodies (11 hrs.)**

- 2.1 Antigens: Definition, Classification, Functional Characteristics (Immunogen, Hapten, Antigenic Determinants and Epitopes)
- 2.2 Antibody: Primary Structure, Classification and Functions
- 2.3 Antigen - Antibody Reaction: Nature and Consequences

**Unit 3**

**Immune Response (12 hrs.)**

- 3.1 Characteristics of Immune Responses: Primary and Secondary Immune Responses
- 3.2 Complement System in Innate and Acquired Immunity
- 3.3 Hypersensitivity Reactions: Types and Immune Reactivity
- 3.4 Transplant Rejection: Types of Transplant/Graft, Causes For Rejection and Immuno-Suppression

**Unit 4**

**Mediators of Immune System and Immune-Regulation (10 hrs.)**

- 4.1 Cytokines: Definition, Properties, Signal Transduction
- 4.2 Immune Reactions in Viral, Bacterial and Parasitic Infections

**Unit 5**

**Diseases and Vaccines (9 hrs.)**

- 5.1 Autoimmune Disorder: Systemic Lupus Erythematosus and Rheumatoid Arthritis
- 5.2 Infectious Diseases and Vaccines
- 5.3 Vaccines: Principles and Types

## **TEXT BOOK**

Ashim K. Chakravarty. *Immunology*. New Delhi: Tata McGraw Hill, 1997.

## **BOOKS FOR REFERENCE**

Brostoff, Jonathan, David Male, and Ivan M Roitt. *Immunology*. Karger Barel, 1994.

Coico, R., G. Sunshine, and E. Benjamini. *Immunology*. John Wiley & Sons, 2013.

Fatima, D. and N. Arumugam. *Immunology*. Saras, 2013.

Gangal, S. and S. Sontakke. *Textbook of Basic and Clinical Immunology*. Orient Blackswan, 2013.

Goldsby, R.A., Thomas J. Kindt, Barbara A. Osborne. *Kuby Immunology*. New York: W.H. Freeman and Company, 2013.

Parslow, T.G., D.P. Stites, A.I. Terr, and J.B. Imboden. *Medical Immunology*. Lange Medical Books / McGraw Hill, 2001.

Reeves, G. and I. Todd. *Immunology*. Blackwell Science, 2010.

Roitt, I.M. *Essential Immunology*. Oxford: Blackwell Scientific, 1994.

Wise, D.J and G.R. Carter. *Immunology – A Comprehensive Review*. Blackwell Science, 2012.

## **JOURNALS**

The Journal of Immunology

Open Journal of Immunology

## **WEB RESOURCES**

[www.immunologylink.com](http://www.immunologylink.com)

<http://www.proimmune.com>

## **PATTERN OF EVALUATION**

### **Continuous Assessment:**

**Total Marks: 50**

**Duration: 90 mins.**

Section A – 6 x 2 = 12 Marks (All questions to be answered)

Section B – 3 x 6 = 18 Marks (3 out of 5 to be answered)

Section C – 1 x 20 = 20 Marks (1 out of 2 to be answered)

### **Third Component:**

List of evaluation modes:

Seminars

Quiz

Assignments

Case studies

### **End Semester Examination**

**Total Marks: 100**

**Duration: 3 hours**

Section A – 10 x 3 = 30 Marks (All questions to be answered)

Section B – 5 x 6 = 30 Marks (5 out of 7 to be answered)

Section C – 2 x 20 = 40 Marks (2 out of 4 to be answered)



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**B.Sc. DEGREE: BRANCH VI.A. - ADVANCED ZOOLOGY AND  
BIOTECHNOLOGY**

**SYLLABUS**

(Effective from the academic year 2015 - 2016)

**ANIMAL BEHAVIOUR, ECOLOGY AND IMMUNOLOGY - PRACTICAL**

**CODE: 15ZL/MC/P662**

**CREDITS: 2**

**L T P: 0 0 4**

**TOTAL HOURS: 52**

**ANIMAL BEHAVIOUR**

Animal Associations – One example for each type  
Identification of Bird Nests  
Observation of Learning Behaviour  
Methods of Studying Animal Behaviour – Sampling Methods

**ECOLOGY**

Estimation of the following parameters in different water samples:

Dissolved Oxygen

pH

Salinity

Calcium

Total alkalinity - Free CO<sub>2</sub>, CO<sub>3</sub> and HCO<sub>3</sub>

Qualitative Field tests for Soil Nitrates and Carbonates.

Spotters - Rocky Shore and Sandy Shore Fauna

**IMMUNOLOGY**

VDRL Slide Flocculation Test for Syphilis

ELISA – Qualitative Test for Pregnancy

Radial Immunodiffusion Test (Demonstration)

Ouchterlony Double Immunodiffusion Test (Demonstration)

Observation of Plates – Immune Cells

**Demonstration** – Anatomical Location of Various Immune Tissues and Organs in Fish

**RECORD WORK**

Maintenance of a record of practical work done is essential for continuous Assessment.

**PATTERN OF EVALUATION**

**CONTINUOUS ASSESSMENT:**

Total Marks: 50

Duration: 3 hours

Question – I Major Question 20 marks

Question – II Minor Question 15 marks

Question – III Spotters (Five) 15 marks

**END SEMESTER EXAMINATION:**

Total Marks: 50

Duration: 3 hours

Question – I Major Question 20 marks

Question – II Minor Question 15 marks

Question – III Spotters (Five) 15 marks