



**Rajarshi Shahu Mahavidyalaya,(Autonomous)  
Latur.**

**Syllabus  
B.Sc. First Year  
ZOOLOGY**

**(First and Second Semester)  
Semester Pattern  
W.e.f 2013-14**

**RAJARSHI SHAHU MAHAVIDYALAYA, LATUR.**

Semester wise course structure

.B.Sc. F.Y. Zoology w.e.f. the Academic Year 2013-2014

DEPARTMENT OF ZOOLOGY

SYLLABUS

<b>Sr.No.</b>	<b>Semesters</b>	<b>Course Title</b>	<b>Papers No.</b>	<b>Marks</b>	<b>Periods</b>
1.	I	General Zoology	I	50	45
		Cell Biology and Bioinstrumentation	II	50	45
		Lab.Course	III	50	
2.	II	Developmental Biology	IV	50	45
		Histology and Histochemistry	V	50	45
		Lab.Course	VI	50	45

**RAJARSHI SHAHU MAHAVIDYALAYA, LATUR.**

Semester wise course structure

.B.Sc.S.Y. Zoology w.e.f. the Academic Year 2014-2015

DEPARTMENT OF ZOOLOGY

SYLLABUS

<b>Sr.No.</b>	<b>Semesters</b>	<b>Course Title</b>	<b>Papers No.</b>	<b>Marks</b>	<b>Periods</b>
1.	III	Molecular Biology and Biological Chemistry	VII	50	45
		Genetics	VIII	50	45
		Lab.Course	III	50	
		Lab.Course	IV		
2.	IV	Comparative anatomy, Animal Physiology and Immunology	X	50	45
		Genetic Engineering	XI	50	45
		Lab.Course	V	50	45
		Lab.Course	VI		

**RAJARSHI SHAHU MAHAVIDYALAYA, LATUR.**  
 Semester wise course structure  
 .B.Sc. T.Y. Zoology w.e.f. the Academic Year 2015-2016  
 DEPARTMENT OF ZOOLOGY AND FISHERY SCIENCE  
 SYLLABUS

<b>Sr.No.</b>	<b>Semesters</b>	<b>Course Title</b>	<b>Papers No.</b>	<b>Marks</b>	<b>Periods</b>
1.	V	Ecology and Evolution	XIII	50	45
		Animal Biotechnology-I	XIV	50	45
		Lab.Course	VII	50	45
		Lab.Course	VIII		
2.	VI	Ethnology, Biostatistics and Bioinformatics	XVI	50	45
		Animal Biotechnology-II	XVII	50	45
		Lab.Course	IX	50	45
		Lab.Course	X		

**RAJARSHI SHAHU MAHAVIDYALAYA, LATUR.**

Semester wise course structure

.B.Sc. F.Y. Zoology w.e.f. the Academic Year 2013-2014

Sub: Zoology (U-Zoo-156)

**GENERAL ZOOLOGY-I**

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**Learning Objective:**

- Students will be able to identify and define invertebrates and Vertebrates.
- Students will be able to classify animals as an invertebrate and Vertebrate.
- Students will be able to compare different classes of invertebrates and Vertebrates.

**Course Outcomes:**

- Learner can differentiate the invertebrates and Vertebrates.
  - Learner can classify an invertebrates and Vertebrates.
  - Learner can compare invertebrates with Vertebrates with different basic characters.
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**Unit – I Invertebrates-Taxonomy and general characters and classification with suitable example:**

- Protozoa and porifera
- Coelenterata and Helminthes
- Annelida and Arthropoda
- Mollusca and Echinodermata
- Protochordata:-Hemichordata, Urochordata and Hemichordata

**Unit –II**

**Type study:**

- Life cycle of Plasmodium, Pathogenesis and Control measures
- External morphology of Leech
- Digestive and Respiratory system of Leech
- Circulatory, Nerves system and Reproductive system of Leech
- Water Vascular System
- Retgressive metamorphosis

**UNIT:-III**

**Vertebrates- Taxonomy and general characters and classification with**

**suitable example:**

- Basic characteristics of chordates.
- Agnatha-Cyclostomata
- Pisces
- Dipnoi
- Amphibia and Reptalia-Identification of Poisonous and Non- Poisonous Snake
- Aves and Mammalia-Prototheria, Metatheria and Eutheria

**UNIT:-1V**

**Type study: Rat**

- Morphology
- Digestive system
- Respiratory system
- Circulatory, Brain and Reproductive system
- Sense organs: - Ear and Eye.

**Suggested Readings**

1. Invertebrate Zoology by Jordan E.L. and P.S.Verma S.Chand Publication, and Co., Ltd. Ram nager New Delhi
2. Vertebrate Zoology by Jordan E.L. and P.S.Verma S.Chand Publication, and Co., Ltd. Ram nager New Delhi
3. Non-Chordate Zoology by Dhahi and Dhahi Pradeep Publication, Opposite Sitla Mandir, Jalndhar-144008
4. Chordate Zoology by Dhahi and Dhahi- Pradeep Publication, Opposite Sitla Mandir, Jalndhar-144008
5. A Text book of Embryology By. Arumugam Saras Publication
6. Rat A mammalian type By G.R. Kshirsagar., G.Y.-Rane Prakashan ,Tilak Road ,Poona 30.

**RAJARSHI SHAHU MAHAVIDYALAYA, LATUR.**

Semester wise course structure

.B.Sc. F.Y. Zoology w.e.f. the Academic Year 2013-2014

Sub: Zoology (U-Zoo-157)

**CELL BIOLOGY AND BIO INSTRUMENTATION-II**

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**Learning Objective:**

- To study the structural and functional organization of cell
- To make the students understand the structure and functions of cell organelles
- To understand the importance of nucleus in the cell
- To understand the role of various physical and chemical components of the cell
- To learn basic techniques in cytology
- To study various instrument.

**Course Outcomes:**

- Learner would acquire insight of transport mechanisms for maintenance and composition of cell
  - Learner would able to find out chemical composition of cell and its organelles.
  - Learner would acquire skill of different instruments for research analysis.
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**Unit – I**

- i) Origin of life (Theory of Chemical Evolution)
- ii) Cell and Cell Theory
- iii) Ultra structure of prokaryotic and eukaryotic cell
- iv) Comparison between plant and animal cell
- v) Structure and Function of plasma membrane

**Unit –II**

- i) Structure and Function of organelles:-a)Endoplasmic reticulum, b)Golgi complex  
c)Mitochondria d) Ribosome e) Lysosome
- ii) Structure and function of Nucleus and Chromosome
- iii) Cell cycle-Its regulation and Significance,
- iv) Mitosis, Meiosis and their significance.
- v) Apoptosis

**UNIT:-III**

- i) Light microscopy
- ii) Electron microscopy
- iii) Cell Fractionation and Centrifugation
- iv) Autoradiography

**UNIT:-1V**

- i) Chromatography: - Paper, Thin layer, Column Chromatography
- ii) Electrophoresis-Principles and Working
- iii) Colorimetry- Principles and Working
- iv) PH meter- Principles and Working
- v) Micro-Technique

**Suggested Readings**

1. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology by P.S.Verma and V. K. Agarwal S.Chand Publication, and Co., Ltd. Ram nager New Delhi
2. Cell (A Molecular approach): Cooper, G. M.
3. Cell and Molecular Biology (1996) Karp, G.
4. Cell Biology (1993) Sativa D. E.
5. Cell and Molecular Biology (1995) Kish V. M. and Kleinsmith L. J.
6. Cell and Molecular Biology: deRobertis and deRobertis
7. Cell Biology by C.B. Pawar
8. Elements of Biotechnology by P.K. Gupta and Rastogi

**RAJARSHI SHAHU MAHAVIDYALAYA, LATUR.**

Semester wise course structure

.B.Sc. F.Y. Zoology w.e.f. the Academic Year 2013-2014

Sub: Zoology (U-Zoo-158)

Lab Course-I

**GENERAL ZOOLOGY AND CELL BIOLOGY AND BIO INSTRUMENTATION**

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**Learning Objectives**

- To make the students to understand the different animals by Museum study.
- To make the students to understand the staining, mounting and micro techniques like blood smear. Squash preparation..
- To make the students to understand chromatography techniques.

**Course Outcome**

- Learners would understand the taxonomy of different animals.
  - Learners would be able to identify microscopic organism by Staining techniques
  - Learners would be able to understand process of cell division by Squash preparation.
  - Learners would analyze the biomolecules by chromatography techniques.
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**1) Museum Study-I**

Study of at least two museum specimens from invertebrate phyla (protozoa to Echinodermata and Protochordata)

**2) Museum Study-II**

Study of at least two museum specimens from Cyclostomata to Mammalia

**3) Mountings:**

Spicules and gemmules of sycon  
Obelia colony,  
Jaws of leech & Nephridia.  
Nereis Parapodia  
Scales: Ctenoid, Cycloid and Placoid

**4) Staining**

Identification of microorganism and Plankton from water sample by single staining technique.

**CELL BIOLOGY AND BIO INSTRUMENTATION**

1. To demonstrate the presence of mitochondria in striated muscle cells and epithelial cell using vital stain Janus Green B.
2. Squash preparations to observe stages of Mitosis and Meiosis in onion root tips, and bud anthers temporary /Grasshopper testis respectively
3. Study of mitosis and meiosis from permanent slides.
4. Identification and study of cells- Slides/Photomicrographs/live cell  
(Amoeba, Sperm, Euglena, Bacteria).
5. Identification and study of Skeletal, smooth and cardiac muscles by staining method.
6. Study of blood cells by staining smear
7. Five permanent stained micro preparations.
8. Separation of lipid/amino acid by paper and thin layer chromatography .
9. Colourimetric estimation of glucose/protein/.
10. Excursion report

**RAJARSHI SHAHU MAHAVIDYALAYA, LATUR.**  
**Semester wise course structure**  
**.B.Sc. F.Y. Zoology w.e.f. the Academic Year 2013-2014**  
Sub: Zoology (U-Zoo-257)  
**DEVELOPMENTAL BIOLOGY**

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**Learning objective**

- To acquaint the learner with key concepts of embryology.
- To study causes of infertility.
- To study importance of stem cell.

**Course Outcomes:**

- Learner will be able to understand and compare the different pre- embryonic stages
  - Learner will be able to appreciate the functional aspects of extra embryonic membranes and classify the different types of placenta.
  - Learner will be able to understand causes of infertility and importance of stem cells
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**Unit –I Introduction**

- i) Gametogenesis- Spermatogenesis and Oogenesis,
- ii) Types of eggs,
- iii) Male and Female gametes
- iv) Fertilization

**Unit –II Early Embryonic Development of frog**

- i) Cleavage
- ii) Blastula ion and Gastrulation
- iii) Differentiation of germ layers
- iv) Metamorphosis- changes and hormonal regulation of metamorphosis amphibians

**Unit –III**

- i) Extra embryonic membranes in Chick
- ii) Placenta in mammals- structure, types and physiology of placenta
- iii) Regeneration in animals-(invertebrates and Vertebrates)

**Unit-IV**

- i) Infertility
- ii) Diagnosing Infertility-Test tube baby and Gamete intra fallopian transfer.
- iii) Ageing concept
- iv) Stem cell- Embryonic stem cell, Adult stem cell, Haemopoetic stem cell, Nervous stem cell,

**Suggested Readings**

1. A Text book of Embryology By. Arumugam Saras Publication
2. Elements of Biotechnology by P.K. Gupta and Rastogi
3. Developmental Biology: - Scott F. Gilbert
4. Balinsky: Introduction to embryology (CBS College Publisher)
5. Berril, N.J. Developmental Biology (Tata-McGraw Hill)

**RAJARSHI SHAHU MAHAVIDYALAYA, LATUR.**

Semester wise course structure

.B.Sc. F.Y. Zoology w.e.f. the Academic Year 2013-2014

Sub: Zoology (U-Zoo-258)

Theory syllabus

**HISTOLOGY AND HISTOCHEMISTRY**

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**Learning Objectives:**

1. Understanding of the basics and importance of Histology and Histochemistry.
2. Learners would increase awareness of Histochemistry as a branch of pathology in treatment.
3. Learners would be receiving the facts of incisions caused due to any accident and its treatment with advanced stains and methods.

**Course outcomes:-**

1. Learner will be able to understand and compare the different key concepts of Histology and Histochemistry
  2. -Learner will be able to understand structural aspect of different organs
  3. -Learner will be able use various histochemical techniques for analysis of different biochemical's like Proteins, carbohydrates, Lipids. and Nucleic acid
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**Unit –I Tissues and Its aggregation**

- 1) Epithelial tissue:
  - i) Squamous
  - ii) Cuboidal
  - iii) Columnar
  - iv) Glandular
- 2) Connective tissue  
Hyaline cartilage, Bone, blood and lymph

**Unit –II Histology of organs**

- i) Stomach
- ii) Intestine
- iii) Live
- iv) Kidney
- v) Pancreas

**Unit –III Histology of endocrine gland**

- i) Pituitary gland
- ii) Thyroid gland
- iii) Adrenal gland
- iv) Testis and Ovary

**Unit-IV Histochemical Technique for Proteins, Carbohydrates and Lipids**

- i) Protein:-Ninhydrin Schiff Method (Amino groups), Sakaguchi Method (Arginine)
- ii) Carbohydrates- PAS reaction (Bauer-Feulgen method -Glycogen)
- iii) Lipids – Oil Red O Method, Sudan black B method.
- iv) Histochemical Technique for Nucleic Acid  
DNA – Feulgen Nuclear Method, DNA extraction (Brachet)

**Suggested Readings**

1. Patki, L.R. et al., 1983. An introduction to Micro technique. S. Chand
2. Bruce Casselman, W.G. (1962) Histochemical technique. Butter and Tanners
3. Bancroft, J.D., Alan Stevens and Turner, D.R. 1996. Theory and Practice of Histological Techniques. Churchill Livingstone, New York
4. Histology Mammals: Athavale, M.V. and Latey, A.N.
5. 4.Histology Greep: R.O. and Well,L.



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Sub: Zoology (U-Zoo-259)

Lab.Course-II

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**DEVELOPMENTAL BIOLOGY AND HISTOLOGY AND HISTOCHEMISTRY**

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**Learning Objectives**

- To make the students to understand the life history of frog.
- To make the students to understand the developmental study of chick.
- To make the students to understand the different tissues and stem cells.
- To make the students to understand the Microtomy techniques.

**Course Outcome**

- Learners would understand the life history of frog.
  - Learners would be able to identify permanent slides of chick embryo.
  - Learners would be able to understand process of cell division by Squash preparation.
  - Learners would able to prepared permanent slides of different tissues.
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**DEVELOPMENTAL BIOLOGY**

1. Study of eggs and tadpole of frog from collected/Preserved material
2. Study of frog development through permanent slides and models/Chart.
3. Whole mount preparations of chick embryos
4. Types of eggs-study.
5. Types of Sperms smear preparation
6. Regeneration in invertebrates and vertebrates
7. Parthenogenesis in Honey bee
8. Study of permanent slides of Chick Embryo: 18 hrs. 24 hrs., 36 hrs., 48 hrs., 72 hrs. stages.
9. Identification and study of male and female gametes of frog.

**HISTOLOGY AND HISTOCHEMISTRY**

1. Temporary preparation of Squamous epithelium, ciliated epithelium, skeletal muscle fiber and blood smear.
2. Study of histological structure of following organs – Stomach, intestine, pancreas, liver, kidney, testis, ovary, thyroid, adrenal and pituitary.
3. Preparation of histological permanent slides by the process of block preparation, section cutting and staining.
4. Location of biomolecules like, protein, carbohydrates, lipids and DNA in tissues by Histochemical technique
5. Compulsory educational excursion tour to visit various zoological important centre.



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**Syllabus  
B.Sc. First Year  
ZOOLOGY**

**(First and Second Semester)  
Semester Pattern  
W.e.f. 2013-14**