



St. Xavier's College – Autonomous Mumbai

Syllabus For III Semester Courses in Zoology (June 2016 onwards)

Contents:

Theory Syllabus for Courses:

S.Zoo.3.01- Ethology and Parasitology

S.Zoo.3.02 - Biostatistics and Evolution

S.Zoo.3.03 - Advanced Genetics and Bioinformatics

Practical Syllabus for Course: S.Zoo.3.PR

S.Y.B.Sc. Zoology

S.ZOO.3.01

ETHOLOGY AND PARASITOLOGY

Learning Objectives:

- To enable students understand animal strategies and interactions and emphasize the importance of behaviour for survival.
- To help students gain an in depth understanding of some disease causing protozoan and helminth parasites

Number of lectures: 45

Unit 1

Animal Learning:

(15 lectures)

- Associative and instrumental learning
- Insight learning and Cognition
- Constraints of learning
- Animal interactions

Unit 2

Ethology:

(15 lectures)

- Ontogeny of behaviour and sensitive periods during development
- Environmental influence on behaviour
- Communication in animals
- Adaptive strategies (ESS) and foraging strategies in animals

Unit 2

Parasitology:

(15 lectures)

- Parasites (Ectoparasites, Endoparasites, Digenetic, temporary, Permanent, Facultative)
- Hosts (Definitive, Intermediate, paratenic, reservoir)
- Morphology , mode of infection, life cycle, pathogenicity, prophylaxis and treatment of
- Protozoan parasites – *Entamoeba histolytica*, *Leishmania donovani*, *Plasmodium vivax*, *Typanosoma gambiense*, *Giardia intestinalis*.
- Helminth Parasites – *Taenia solium*, *Ancylostoma duodenale*, *Wuchereria bancrofti*, *Ascaris lumbricoides*, *Dracunculus medinensis*

Recommended References:

1. Animal Behaviour – Mechanism, Ecology, Evolution by Drickamer, Vessey, Jakob
2. Animal Behaviour – Its development, Ecology and Evolution by Robert A Wallace. Goodyear Publishing Company
3. Animal Behaviour by David McFarland. Pitman Publishing ltd
4. Textbook of Animal behaviour by F.B.Mandal. PHI
5. Behaviour by M. Dockery and M Reiss. Cambridge University press.
6. Introduction to Animal Behaviour by Manning and Dawkins. Cambridge Univ. Press
7. Animal Parasitology by JD Smyth. Cambridge University Press
8. Parasitology - Protozoology & Helminthology by K.D. Chatterjee
9. Essentials of Human Parasitology by Judith S Heelan, Frances W Ingersoll. Delmar Thomson Learning
10. Medical Parasitology - A Practical approach by S.H.Gillespie and P.M. Hawkey. Oxford Univ Press
11. Manson's Tropical Diseases – P.H. Manson. Bahr Cassell and Co. Ltd.

Practical Course:

1. Identification of Protozoan parasites – Entamoeba, Leishmania, Trypanosoma, Plasmodium, Giardia
2. Identification of Helminth parasites – Taenia, Ancylostoma, Wuchereria, Ascaris, Dracunculus
3. Parasitic adaptations – Taenia (scolex, proglottid), Trypanosoma, Entamoeba, Ascaris, Giardia
4. Mounting of mouthparts of mosquito/bed bug and house fly
5. Demonstrate wing cleaning in housefly and observation of feeding behaviour
6. Study of animal interactions
 - a. Parasitism (Ecto and Endo)
 - b. Mutualism
 - c. Commensalism
7. To study antennal grooming in cockroach
8. Study of optimal foraging strategies and ideal free distribution using guppy

S.Y.B.Sc. Zoology

S.ZOO.3.02

BIostatISTICS AND EVOLUTION

Learning Objectives:

- ❖ To learn basic concepts in statistics and their application in biology
- ❖ To understand basic framework of evolutionary biology

Number of Lectures: 45

Unit 1

Descriptive Statistics:

(15 lectures)

- Introduction to Biostatistics
- Sampling
- Describing your data – Measures of central tendency and dispersion
- Depicting your data – graphical representation
- Different types of distributions- Normal, Binomial, Poisson distributions, Central limit theorem and confidence interval

Unit 2

Inferential Statistics:

- Hypothesis testing – General framework, Idea of probability, Type I and II errors, Idea of Significant difference.
- Parametric tests - Z-test, t-test, G-test
- ANOVA
- Non-parametric tests – Wilcoxon test, Man-Whitney U test
- Regression and Correlation

Unit 3

Evolution:

(15 lectures)

Natural selection: The driving force in evolution??

- Darwins idea of natural selection
- Do we really need fossils??
- The missing Link. Is anything missing???

Neo Darwinism: Natural selection revisited

- Natural selection revisited and remodified

Evolution of genome/gene

Phylogenetic Analysis

- Phylogenetics – Use of sequence to decipher distance
- Phylogenetic trees - Cladogram, Dendogram

Recommended References:

1. Biostatistics: A foundation for analysis: Daniel. Wiley Publishing House
2. Statistical Methods in Biology: Norman Bailey. Cambridge Low Price Edition
3. Choosing and Using Statistics: A Biologist's Guide: Calvin Dytham. Blackwell Publishing
4. Origin of Species – Charles Darwin.
5. Evolution: Mark Ridley. 3rd edition
6. Evolution: Douglas Futuyama. 3rd edition
7. What Evolution Is: Ernst Mayr

Practical Course:

1. Descriptive Statistics – Central Tendency Problems
2. Descriptive Statistics – Dispersion Problems
3. Graphical Representation
4. Computers in biostatistics – Use of Excel and other softwares
5. Evolution in Jaw and cranium: Fish, Amphibian, Reptile, Bird, Mammal
6. From water to land: the evolution of limb in animals
7. Constructing phylogenetic trees.

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S.Y.B.Sc. Zoology

S.ZOO.3.03

ADVANCED GENETICS AND BIOINFORMATICS

Learning Objectives:

- This course aims at a comprehensive understanding of genetics and its varied applications whilst shedding light on more fundamental concepts of sex determination and mutations affecting genes.
- In Bioinformatics students are exposed at a basic level to the exciting world of fusion between IT and Biology and the enormous advances and uses of this field.

Number of Lectures: 45

Unit 1

Genetics 1:

(15 lectures)

Population Genetics

- Hardy-Weinberg equilibrium
- Proof of HW equilibrium
- Exceptions to the rule
- Problems on HW equilibrium

Linkage Mapping

- Proof of crossing over
- Two point cross
- Three point cross
- Use of linkage analysis in gene Mapping

Unit 2

Genetics 2:

(15 lectures)

Sex Determination in Man

- Red herrings along the way
- The Sry story

Sex determination in Drosophila Melanogaster

Chromosomal aberrations

- Deletion, Duplication, Translocation, Inversion, non-disjunction, fragile X

DNA mutations

- Transition, Transversion, Insertion, Deletion, Frame shift

DNA Replication

- Models of DNA replication, Hershey Chase experiment
- Molecules and Mechanism in Prokaryotes
- Molecules and Mechanism in Eukaryotes

