



Hindi Vidya Prachar Samiti's
Ramniranjan Jhunjhunwala College
of Arts, Science & Commerce
(Empowered Autonomous College)
Affiliated to
UNIVERSITY OF MUMBAI

Syllabus for S.Y.B.Sc ZOOLOGY(under NEP)
Vertical under NEP: Skill Enhancement Course (SEC)
Title: AQUASCAPING -AQUARIUM MANAGEMENT
COURSE CODE: RJSECZOO231

(REVISED in 2024-2025 in alignment with the NEP 2020 facilitating the inter-and multidisciplinary learning and multiple entry and exit of the students)

(CBCS 2024-2025)

PREAMBLE

The National Education Policy 2020 aims at imparting skill-based learning and caters to the multiple entry and exit facility for the students thus empowering them to acquire knowledge at their pace. In the three-year UG program, the student has two exit options. Students also have the option of choosing the Honors program of four years study in a given discipline and later converting it to five-year integrated PG degree program. As an undergraduate student, he/she learns the core subject (Major), subject complementing the core subject (Minor), a course from other discipline (OEC or GEC) Vocational and Skill Enhancement course from the Major (VSEC). The remaining verticals under NEP 2020 are IKS (Indian Knowledge System), AEC (Ability Enhancement Course), VEC (Value Enhancement Course) and with progressive three years of UG, student also completes at different levels OJT (On Job Training), FP (Field Projects), CEP (Community Engagement Program), RP (Research Project) which helps him/her in understanding their roots, application of the knowledge for the benefit of self and the society. Vertical CC (Co-curricular activities and activities related to yoga and human well-being) helps in preparing youth with good character and interpersonal relationships.

The subject of Zoology offers the basic understanding about the vast diversity of the animal kingdom across the globe. It enables the students to strengthen their knowledge in Animal Sciences and in the other allied branches of Zoology. Keeping the interest of learner in mind, the syllabus has been carefully designed. It has a balance of the classical aspects of Zoology which includes topics like taxonomy, ecology, ethology, developmental biology, physiology, fishery science. The syllabus also includes applied subjects like biochemistry, pathology, immunology.

The undergraduate curriculum has been meticulously designed by considering the need for the subject development, industry requirement, research outlook, competitive exams and entrepreneurship skills. Each unit included in the syllabus has clearly defined objectives. It focuses on outcome-based learning. It aims at inculcating the critical thinking, enhancing the analytical ability, developing writing skills of the students. The syllabus includes field trips to ecological habitats, national parks, sanctuaries, natural history museum, reputed research institutes and industries to widen the student's horizon. The students are encouraged to participate in various project-based activities.

Owing to the current needs of the industry and other sectors, the syllabi is designed in a manner that the learner will be able to apply the knowledge and skills acquired in varied fields. The course encourages a sense of responsibility and empathy towards all living beings, promoting sustainable practices in the learner.

PROGRAMME OUTCOMES (PO) OF UNDERGRADUATE DEGREE PROGRAMMES

Program outcome refers to the overall characteristic an individual is supposed to acquire on completion of the three-year degree program in Bachelor of Science. The attributes based on acquisition, accumulation, and processing of knowledge of the subject are transferable beyond the discipline and useful in different domains of life.

Critical Thinking: Concepts, methodology and ability to formulate questions stimulate the inquisitiveness and critical thinking amongst the students.

Scientific Temperament: The nurturing of the young minds to observe and analyse the experiments in the laboratory or a phenomenon occurring around them to obtain a logical scientific explanation for it.

Analytical Thinking: The ability to think analytically can be developed by training and practice. The syllabus offers the student to understand the concept and design projects or experiments based on them.

Domain knowledge: The domain knowledge is the key to the understanding of advances and complex subject matter.

Social Ethics: The students are exposed to different problems caused due to human activity. They learn to conduct themselves without creating a damage to fellow beings.

Animal Ethics: The sensitization towards ethical issues associated with use of animals in the laboratory is highlighted and the solutions to overcome it are introduced.

Problem Solving: The ability to handle a situation is enhanced in the students by problem solving assignments, case studies, projects to make them competent, conscious and creative individual.

Environmental Sustainability: Environment related issues are addressed through workshops, Guest lectures and field studies.

PROGRAMME SPECIFIC OUTCOMES (PSOS)-BSc PROGRAMME IN ZOOLOGY

PSO1	Understands the nature and basic concepts of systematic classification, ecology, biomolecules, animal biotechnology, cell biology and genetics.
PSO2	Analyse and comprehend the concepts of Enzymology, developmental biology, histology and molecular biology. Acquaint with the skills in fishery biology, medical diagnostics and environment management to boost entrepreneurship skills.
PSO3	Acquire skills and necessary training for techniques in haematology, immunology, physiology, endocrinology, enzymology, molecular biology, toxicology and field biology. Enhance knowledge on biostatistics, bioinformatics, Wild-life tourism and epidemiology to provide wider job prospects in the realm of Zoology.
PSO4	Perform laboratory procedures as per standard protocols in the areas of animal diversity, genetics, biochemistry, molecular biology, physiology, immunology, developmental biology, environmental biology and ethology.
PSO5	Apply ethical principles and knowledge in understanding of Zoology to one's own life and work. Applications of biological sciences in different areas that contributes towards Nation building.

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S.Y.B.Sc NEP Zoology Skill Enhancement Course (SEC) Syllabus Semester -III & IV

SEMESTER	:	III
TITLE OF THE SUBJECT/COURSE	:	AQUASCAPING-AQUARIUM MANAGEMENT
COURSE CODE	:	RJSECZOO231
CREDITS	:	02
DURATION	:	60 hours

LEARNING OBJECTIVES	
1	To learn the basic principles, themes and steps needed to set-up and maintain an aquarium
2	To make the students well versed in their practical skills starting from setting of aquaria to the aquarium fish production
3	Entrepreneurial skill attainment in management of aquarium fishes and food fishes

COURSE OUTCOMES	AFTER COMPLETING THE COURSE, THE LEARNER WILL BE ABLE TO:	PSO ADDRESSED	BLOOM'S TAXONOMY LEVEL
CO1	Comprehend the key skills needed to set up an aquarium.	2,3,4,5	BT level 3,6 Apply and Create
CO2	Identify and differentiate the different aquarium/ornamental fishes.	2,3,4,5	BT level 1, 2 Identify and Describe
CO3	Formulate fish food that provides with complete nutritional benefits	2,3,4,5	BT level 3,6 Apply and Create
CO4	Analyze the required budget to set up a well-maintained home aquarium.	2,3,4,5	BT level 3,4,5 Apply, analyse and evaluate

SEMESTER III
SKILL ENHANCEMENT COURSE: AQUASCAPING-AQUARIUM MANAGEMENT
(PRACTICAL BASED)
PAPER CODE: RJSECZOO231
Module 1: Setting of Aquarium its maintenance, Aquarium plants and fishes. Module 2: Food and Feeding : Natural Food, formulated/Artificial Food Module 3: Fish Diseases: Protozoan, Bacterial, Viral, Helminth Module 4: Packing and Transport Visit to Aquarium

REFERENCES

1. A Handbook of Fish Diseases By R Thanwal 2014 Ashta Publishers and Distributors. 2014 ISBN/ISSN 9789382126447
2. Advances in Fish Diseases and Disorders: Diagnosis and Treatment By Steve Singer, 2013 , Anmol Publication ISBN/ISSN 9788126151608
3. Aquarium and Management by Dr Nandita Singh, Dr Surekha Gupta ,Dr Geeta Joshi, 2023 Akinik Publication ISBN 978-93-5570-765-9.
4. Aquarium Fish By Harper Don 2006, Harper Collins Publishers ISBN/ISSN 9780060890674
5. Arumugam N 2014. Aquaculture and fisheries Saras Publication Kanyakumari.
6. Bacterial Fish Pathogens Disease of Farmed and Wild Fish 2016 Brian Austin , Dawn A. Austin Springer Publication ISBN 9783319326740 (online) 9783319326733 (print)
7. Diseases and Parasites of freshwater Fish By Angling series ,2011
8. Fish Pathology By Ronald J Roberts Wiley Blackwell Publishing 2012 ISBN/ISSN 9781444332827
9. Handbook of Fish Diseases by Howard H. Hirschhorn, 1989, T.F.H Publication ISBN/ISSN 9780866227032
10. Manual of Fish Health by , Chris Andrews/Adrian Exell 2010 Ontario Publication ISBN/ISSN 9781554076918

S.Y.B.Sc Zoology Semester III

MAJOR BATCH: SEC EVALUATION PATTERN

COURSE CODE: RJSECZOO231

(Based on the centralized guidelines given by EC under NEP 2020)

Internal Evaluation : 20 MARKS

External- Semester End Evaluation Practical examination - 30 MARKS

Total marks per course – 50 MARKS

INTERNAL COMPONENT EVALUATION

Q.1 Assignment based on aquarium setting/maintenance. **(15)**

Q.2. Aquarium visit report. **(05)**

EXTERNAL COMPONENT EVALUATION

Q.1 Estimate Dissolved oxygen in the given aquarium water sample. **(10)**

OR

Estimate Nitrite- Nitrogen ($\text{NO}_2\text{-N}$) in the given aquarium water sample.

Q.2 Identification: **(10)**

- One equipment used in aquarium setting.
- One plant used in aquarium.
- One aquarium fish.
- One specimen from fish feed.
- One disease in aquarium fish.

Q.3 Viva **(05)**

Q.4 Journal **(05)**

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S.Y.B.Sc NEP Zoology Skill Enhancement Course (SEC) Syllabus Semester -III & IV

Class	Course Name	Course Code	Local relevance	Regional relevance	National relevance	International relevance
S.Y B Sc Zoology	Aquascaping-Aquarium management	RJSECZOO231	Relevance of Population Dynamics Locally. It helps them learn about natural Habitats.	Study of diversity of fishes and aquarium plants relating it with their regional distribution.	The techniques learnt can be used to study distribution of animals in India.Help in biodiversity conservation.	The techniques learnt can be used in maintaining aquarium across the globe.

Mapping of the course to Local/ Regional/National/International relevance

Mapping of the course to Employability/ Entrepreneurship/Skill development

Class	Course Name	Course Code	Topic focussing on Employability/ Entrepreneurship/skill development	Employability/Entrepreneurship/Skill development	Specific activity
S Y B Sc Zoology	Aquascaping-Aquarium management	RJSECZOO231	Systemics and Diversity focus on the identification and classification of aquarium fishes.	The topics focus on identifying fishes their maintenance,food and diseases The knowledge gained helps Fishpreneurship Development. The skill for employability as Aquarium keeper.	Knowledge of Aquarium fishes, Plants ,fish diseases and treatment. Aquarium Water quality

Integration of Cross cutting Issues

Class	Course Code	Cross Cutting Issues
S Y B Sc Zoology	RJSECZOO231	Ethics, Environment and Sustainability UNSDG 2,4, 8, 12 NEP2020 Interdisciplinary

SEMESTER IV



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Syllabus for S.Y.B.Sc ZOOLOGY(under NEP)
Vertical under NEP: Skill Enhancement Course (SEC)
Title: Food adulterants and Safety measures
COURSE CODE: RJSECZOO241

(REVISED in 2024-2025 in alignment with the NEP2020 facilitating the inter-and multidisciplinary learning and multiple entry and exit of the students)

(CBCS 2024-2025)

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S.Y.B.Sc NEP Zoology Skill Enhancement Course (SEC) Syllabus Semester -III & IV

SEMESTER	:	IV
TITLE OF THE SUBJECT/COURSE	:	FOOD ADULTERANTS AND SAFETY MEASURES
COURSE CODE	:	RJSECZOO241
CREDITS	:	02
DURATION	:	60 hours

LEARNING OBJECTIVES	
1	To learn the basic principles involved in detection of food adulterants.
2	To make the students aware about safety standards applicable to food products.
3	To develop skills in learner to work in food safety standard related industries.

COURSE OUTCOMES	AFTER COMPLETING THE COURSE, THE LEARNER WILL BE ABLE TO:	PSO ADDRESSED	BLOOM'S TAXONOMY LEVEL
CO1	Comprehend the key skills in detection of food adulterants.	2,3,4,5	BT level 2, 3 Understand and Apply.
CO2	Understand and apply the safety standards prescribe by different bodies.	2,3,4,5	BT level 2, 3 Understand and Apply.
CO3	Analyze different food products to check their safety.	2,3,4,5	BT level 3,4,5 Apply, Analyse and Evaluate
CO4	Work with institutes related to development of food safety standards.	2,3,4,5	BT level 3,4,5 Apply, analyse and evaluate

SEMESTER IV
SKILL ENHANCEMENT COURSE: FOOD ADULTERANTS AND SAFETY MEASURES (PRACTICAL BASED)
PAPER CODE: RJSECZOO241
Module I: Introduction to food adulteration and types of food adulterants, Impact of adulteration, Safety measures, Regulatory agencies. Module II: Common milk adulterants and their hazards. Detection methods: MBRT, Starch detection test, Test for detection of Urea, Test for detection of detergent, Using lactometer for finding out density of milk sample Module III: Common adulterants of milk products (like Paneer, Ghee, Khoya, Cheese etc.) and their Detection methods. Detection of adulteration in: Paneer, Ghee and Khoya. Module IV: Adulterants of other common animal (food) products like honey, meat, Fish, poultry: Tests for finding out adulteration in Honey: Flame test, Thumb test, Water test, Vinegar test, Blot test, Heat test.

REFERENCES

1. Detection of the common food adulterants- Edwin M Bruce. Publication Archibald Constable and Co. ltd.
2. Manual- Detect adulteration with rapid tests- Food Safety and Standards Authority of India.
3. Manual of simple methods for testing of common adulterants in food- Food Safety and Standards Authority of India.

S.Y.B.Sc Zoology Semester IV

MAJOR BATCH: SEC EVALUATION PATTERN

COURSE CODE: RJSECZOO241

(Based on the centralized guidelines given by EC under NEP 2020)

Internal Evaluation : 20 MARKS

External- Semester End Evaluation Practical – 30 MARKS

Total marks per course – 50 MARKS

INTERNAL COMPONENT FOR EVALUATION

Q.1 MCQ based on module I, III and IV. (20)

EXTERNAL COMPONENT FOR EVALUATION

Q.1 (10)

Estimate the quality of milk by MBRT method.

OR

Measurement of Density of two different milk samples using lactometer.

Q.2 Identification of milk adulterants Starch, Urea, detergent (any two) (10)

Q.3 Viva (05)

Q.4 Journal (05)

Mapping of the course to Local/ Regional/National/International relevance

Class	Course Name	Course Code	Local relevance	Regional relevance	National relevance	International relevance
S.Y B Sc Zoology	Food adulterants and safety measures	RJSECZOO241	Relevance of Population Dynamics Locally. It helps them learn about food adulterants.	Studies on adulteration in regional products of commercial importance.	Study of National Standards involved in food products and packaging industries.	Study of International Standards involved in food products and packaging industries.

Mapping of the course to Employability/ Entrepreneurship/Skill development

Class	Course Name	Course Code	Topic focussing on Employability/ Entrepreneurship/skill development	Employability/Entrepreneurship/Skill development	Specific activity
S Y B Sc Zoology	Food adulterants and safety measures	RJSECZOO241	Detection of adulterants in milk, milk products and honey	Food safety and food product standard quality check organizations.	Knowledge of food quality standards.

Integration of Cross cutting Issues

Class	Course Code	Cross Cutting Issues
S Y B Sc Zoology	RJSECZOO241	Ethics, Good health and well being UNSDG 3,4,12 NEP2020 Interdisciplinary