The Kelkar Education Trust's
V G Vaze College of Arts, Science and Commerce
(Autonomous)

NEP Syllabus for F.Y.B.Sc.

(2024-25)

Program: B.Sc.

Semester – I and II

Course: Zoology

SEMESTER- I

Course Code	Paper Title	Credit
Zoology- I (Major)	Wonders of Animals and Instrumentation	04 (3L + 1P)
Zoology- I (Minor)	Wonders of Animals and Instrumentation	04 (3L + 1P)
Open Elective (OE)/ General Elective (GE)	Wildlife Ecotourism and Entrepreneurship	04 (3L + 1P)
Vocational Skill Course (VSC)	Ornamental Fishery and management of Aquarium	04 (2L + 2P)

SEMESTER- II

Course Code	Paper Title	Credit
Zoology- II (Major)	Population Ecology and Public Health	04 (3L + 1P)
Zoology- II (MInor)	Population Ecology and Public Health	04 (3L + 1P)
Open Elective (OE)/ General Elective (GE)	Scientific Communication	04 (3L + 1P)
Skill Enhancement Course (SEC)	Wildlife Forensics	04 (2L + 2P)

The Kelkar Education Trust's
V G Vaze College of Arts, Science and Commerce
(Autonomous)

1. Syllabus as per Choice Based Credit System

i) Name of the Programme	: F.Y.B.Sc. Zoology
ii) Course Code	: **Semester-1**
	Semester-2
iii) Course Title	: Zoology
iv) Semester-wise Course Contents	: Copy of the Syllabus enclosed
v) References and Additional References	: Enclosed in the Syllabus
vi) Credit Structure	
No. of Credits per Semester	04
vii) No. of lectures per Unit	15
viii) No. of lectures per week	03
ix) No. of Tutorial per week	: --
x) No. of practical per week	: 01 (per batch)

2. Scheme of Examination : **Internal Assessment (40 marks):**

Class Test : 15 marks,
Assignment : 15 marks
Class Participation: 10 marks

External Assessment (60 marks)
Semester End Exam:
Subjective:
07 Marks - One question out of two and
08 Marks – two questions out of three
for each unit for 3 units. (15 Marks each unit)
15 Marks – 3 questions from each unit all questions are compulsory

3. Special notes, if any	: No
4. Eligibility, if any Admission	: As laid down in the College brochure/ website
5. Fee Structure	: As per College Fee Structure specifications

5. Special Ordinances / Resolutions, if any: No

The Kelkar Education Trust's
V G Vaze College of Arts, Science and Commerce
(Autonomous)

Programme: F.Y.B.Sc. **Semester**: I

Course: Zoology-I **Course code**: VGVUSMZO101

Teaching Scheme (Hrs/Week)				Continuous Internal Assessment (CIA) 40 marks					End Semester Examination	Total
L	**T**	**P**	**C**	**CIA-1**	**CIA-2**	**CIA-3**	**CIA-4**	**Lab**	**Written**	
3	-	1	4	15	15	10		-	60	100
Max. Time, End Semester Exam (Theory) -2Hrs.										

Course Objectives
1) To take learners through a captivating journey of hoarded wealth of marvelous animal world.
2) To inculcate good laboratory practices in students and train them about scientific handling of important instruments
3) To provide all learners a complete insight about the structure and train them with operational skills of different instruments required in Zoology.

SEMESTER - I

COURSE CONTENT			
Unit No.	**Module No.**	**Content**	**Lectures**
1		**VGVUSMZO101- Major & Minor Zoology: Wonders of animals and Instrumentation**	
	I	**Wonders of animal world** i) Bioluminescence in Animals: Noctiluca, Glow worm, Firefly, Angler Fish (Mechanism and use for the animal) ii) Mimicry in Butterflies and its significance: Great Egg fly and Common Crow, Common Palm fly and Plain Tiger. iii) Breeding and Parental care in: i. Pisces - Ovo-viviparous (Black Molly/Guppy), Mouth brooders (Tilapia), Brood pouches (Sea horse) ii. Amphibia - Mouth brooders (Darwin's Frog), Egg carriers (Midwife Toad) iii. Mammals -Egg-laying (Duck-billed Platypus), Marsupials (Kangaroo)	**10**
	II	**Lab safety, Units and Measurements** i) Introduction to good laboratory practices ii) Use of safety symbols: meaning, types of hazards and precautions iii) Units of measurement: i. Calculations and related conversions of each: Metric system- length (meter to micrometer); weight (gram to microgram), Volumetric (Cubic measures) ii. Temperature: Celsius, Fahrenheit, Kelvin iii. Concentrations: Percent solutions, ppt, ppm, ppb dilutions, Normality, Molarity and Molality.	**10**
	III	**Instrumentation** i) Microscopy - Construction, principle and applications of dissecting and compound microscope. ii) Colorimetry and Spectroscopy - Principle and applications. Introduction to GCMS and LCMS iii) Centrifuge - Principle and applications (clinical and ultra-centrifuges) iv) Chromatography- Principle and applications (Partition and Adsorption)	**10**
		Total No. of Lectures	**30**

Beyond the Syllabus
Tutorial Activities: Students' Presentations, Brainstorming sessions, Group Discussions, Use of E-learning, Conferences and Hands-on training practicals

VGVUSMZOP101 (SEMESTER I)

Practical Based on Zoology I (Major & Minor)

List of Experiments	
Sr. No.	**Description**
1	Mounting of foraminiferan shells from sand (any five)
2	a) Separation of pigments by adsorption chromatography using chalk. b) Separation of lipids by Thin Layer Chromatography
3	a) Dilution of given sample and estimation of OD by using colorimeter. b) Calculation of concentration from the given OD using formula.
4	a) Study of parts of microscope and their functions. b) Technique of focusing a permanent slide under 10x and 45x(objectives).
5	Study of types of Corals - Brain, Organ pipe, Stag Horn, Mushroom coral
6	Breeding and parental care in Amphibia- Rhacophorus, Midwife toad, Darwin's frog, Caecilian.
7	Mounting of scales of fish (placoid, cycloid and ctenoid)

Semester I: Wonders of animals and Instrumentation

VGVUSMZO101**(Paper I Course1)** **(Internal Assessment Pattern)**

	Marks: 40
1 Class Test : (Based on Theory Unit 1.2and 3)	15 marks
2 Assignment:	15 marks
3 Class Participation and Overall conduct	10 marks

Semester I:Wonders of animals and Instrumentation

VGVUSMZO101 **(Paper I Course1)** **(Internal Class Test Paper Pattern)**

Duration:	**Marks: 15**
Q.1.Fill in the blanks: (1 or 2 questions each from Unit1,2,3)	05 marks
Q.2. Write short note on:(Any two) a) Unit1 b) Unit2 c) Unit3	10 marks

Semester I: Wonders of animals and Instrumentation VGVUSMZO101 **(Paper I-Course1)** **(Theory Paper Pattern)**	
Duration: 2 hours	**Marks: 60**
Q.1.A. Answer the following (Any one)- Unit 1 A) **OR** A)	**07 Marks**
Q.1. B) Attempt any two of the following: Unit 1 a) b) c)	**08 Marks**
Q.2.A. Answer the following: (Any one) Unit 2 A) **OR** A)	**07 Marks**
Q.2. B) Attempt any two of the following: Unit 2 a) b) c)	**08 Marks**
Q.3.A. Answer the following: (Any one)- Unit 3 A) **OR** A)	**07 Marks**
Q.3. B) Attempt any two of the following: Unit 3 a) b) c)	**08 Marks**
Q.4. Write a note on: (All questions are compulsory) a) Unit1 b) Unit2 c) Unit3	**15 Marks**

Semester I:– Wonders of animals and Instrumentation **VGVUSMZOP101 (Paper I-Course1)** **(Practical Paper Pattern)**	
Duration: 2 hours	**Marks: 50**
Q.1. From the given sample mount foraminiferan shells (Minimum five types) **OR** Q.1. Mounting of scales (placoid and cycloid/ctenoid) from fishes.	**15M**
Q.2. Dilute the given sample and estimate the OD using colorimeter (Three dilutions) **OR** Q.2. Calculate concentration from given OD by formula (3 concentrations) **OR** Q.2. Focus the given slide under 10X & 45X and show it to the examiner.	**05M**

Q.3. Perform experiment for separation of pigments by adsorption chromatography. **OR** Q.3. Calculate Rf value and identify the pigment from chromatogram. **OR** Q.3. Perform Thin Layer Chromatography (TLC) for separation of lipids	**10M**
Q.4. Identify the photograph of the given animals and comment on it a) Based on corals (any one) b) Based on parental care (any one)	**10M**
Q.5. Viva voce	**05M**
Q.6 Journal	**05M**

Course outcomes **Zoology – I (**VGVUSMZO101)
1) Ignite curiosity in the mind of learners, to know more about the fascinating world of animals which would enhance their interest and love for the subject of Zoology
2) Enable learners to work safely in the laboratory and avoid occurrence of accidents (mishaps) which will boost their scholastic performance, knowledge and economy in use of materials/chemicals during practical sessions.
3) To have hands-on-training experience on different instruments, thus can further help them to inculcate applications of instruments in research.

Recommended Resources (VGVUSMZO101)

1. Vertebrate Zoology Volume I- Jordan and Verma, S. Chand and Co.
2. Invertebrate Zoology Volume II- Jordan and Verma , S. Chand and Co.
3. Zoology- S. A. Miller and J. B. Harley, Tata McGraw Hill
4. Introduction to Vertebrates- Moore Cambridge UniversityLow Priced Edition
5. Basic Laboratory Techniques, Instrumentation and Biotechnology- University Text Book of Zoology, F.Y.B.Sc. Semester I Course 2. V.V. Dalvie, R.G. Deshmukh, R. D'souza and H.U. Shingadia University Press.
6. Introduction to Practical Biochemistry – David T. Plummer (Tata McGraw Hill Publishing Co.Ltd.)
7. Methods in Biostatistics – B. K. Mahajan, (Jaypee Publications)
8. Microscopy and Cell Biology - V. K. Sharma, (Tata McGraw Hill Publishing Co. Ltd.)
9. Principles and Techniques of Practical Biochemistry – Keith Wilson and John Walker, (Cambridge University Press)
10. Calculations in Molecular biology and Biotechnology - Frank H. Stephenson, Academic Press.

The Kelkar Education Trust's
V G Vaze College of Arts, Science and Commerce
(Autonomous)

Programme: F.Y.B.Sc. **Semester**: I

Course: OE/GE - Wildlife ecotourism **Course code**: VGVUOE111

Teaching Scheme (Hrs/Week)				Continuous Internal Assessment (CIA) 40 marks					End Semester Examination	Total
L	**T**	**P**	**C**	**CIA-1**	**CIA-2**	**CIA-3**	**CIA-4**	**Lab**	**Written**	
3	-	1	4	15	15	10		-	60	100
Max. Time, End Semester Exam (Theory) -2Hrs.										

Course Objectives
1) To enlighten learners about the current status of wildlife conservation in India in the light of guidelines from different relevant governing agencies with adversity of poaching and biopiracy.
2) To orient learners about the rich heritage of Biodiversity of India and make them understand the significance of its conservation.
3) To introduce various ways that can help in the protection, conservation, management, and enhancement of wildlife populations and habitat.

SEMESTER I

COURSE CONTENT			
Unit No.	**Module No.**	**Content**	**Lectures**
1		**Course code - OE/GE - Wildlife ecotourism**	
	I	**Biodiversity and its Conservation** i) Biodiversity and conservation strategies: in situ, ex-situ, National parks, Sanctuaries and Biosphere reserves. ii) Introduction to International efforts: Convention on Biological Diversity (CBD), International Union for Conservation of Nature and Natural Resources (IUCN), United Nations Environment Program - World Conservation Monitoring Centre (UNEP-WCMC) iii) Introduction to Indian Wildlife (Protection) Act,1972 and Convention for International Trade of endangered species	**10**
	II	**National parks and Sanctuaries of India** i) National Parks - Jim Corbett national park, Sundarban National park, Pirotan island marine park ii) Sanctuaries - Bharatpur Bird Sanctuary, Indian Wild Ass Sanctuary, Koyna wildlife sanctuary iii) Biosphere reserve - Nilgiri Biosphere Reserve, Great Nicobar Biosphere Reserve, Panna National Park	**10**
	III	**Wildlife Management** i) Habit, Habitat, Territory and Niche of Wild Animals:Herbivores, carnivores, solitary, social (flock, pod,community), pack and herd, types of habitats and territories, niche concept ii) Threats to Wildlife - Poaching and hunting, deforestation, encroachment, competition (intraspecific and interspecific), overgrazing and climate change, diseases (zoonosis and reverse zoonosis) iii)Techniques and methods used for wildlife census: Aerial counts, camera trap, line transect census and track surveys, capture mark recapture method, wildlife radiotelemetry iv) Forest policy 1894, 1952, 1988; The Indian Forest Act, 1927; Forest (Conservation) Act,1980.	**10**
		Total No. of Lectures	**30**

Beyond the Syllabus
Tutorial Activities: Students' Presentations, Brainstorming sessions, Group Discussions, Use of E-learning, Conferences and Hands-on training practicals

VGVUOEP111 (SEMESTER-I)

Practical Based on OE/GE - Wildlife ecotourism

List of Experiments	
Sr. No.	**Description**
1	Study of Biodiversity indices through Line transect and Quadrat Method
2	Study of Endangered Species: Data Documentation and graphical representation of CITES data
3	Prepare a report on preservation of wildlife towards conservation
4	Prepare a minimum food budget for any Eco-tour by using the local community as volunteers.
5	Prepare a minimum budget for any adventure Eco-tour by using the concept of sustainable development.
6	Prepare a financial budget for the year and build an Ecovillage/Ecotour/Adventure tour that will contribute to the culture and financial aspects of local communities.

The Kelkar Education Trust's
V G Vaze College of Arts, Science and Commerce
(Autonomous)

Semester I: OE/GE - Wildlife ecotourism VGVUOE111	**(Theory Paper Pattern)**
Duration:	**Marks: 60**
Q.1.A. Answer the following (Any one)- Unit 1 A) **OR** A)	**07 Marks**
Q.1. B) Attempt any two of the following: Unit a) b) c)	**08 Marks**
Q.2.A. Answer the following: (Any one) Unit 2 A) **OR** A)	**07 Marks**
Q.2. B) Attempt any two of the following: Unit 2 a) b) c)	**08 Marks**
Q.3.A. Answer the following: (Any one)- Unit 3 A) **OR** A)	**07 Marks**
Q.3. B) Attempt any two of the following: Unit 3 a) b) c)	**08 Marks**
Q.4. Write a note on: (All questions are compulsory) a) Unit1 b) Unit2 c) Unit3	**15 Marks**

Semester I: OE/GE - Wildlife ecotourism VGVUOEP111	**(Practical Paper Pattern)**
Duration: 2 hours	**Marks: 50**
Q.1. Study of Biodiversity indices through Line transect and Quadrat Method **OR** Q 1. Study of Endangered Species: Data Documentation and graphical representation of CITES data	**15M**
Q.2. Prepare a minimum food budget for any Eco-tour by using the local community as volunteers. **OR** Q.2. Prepare a minimum budget for any adventure Eco-tour by using the concept of sustainable development. **OR** Q. 2 Prepare a financial budget for the year and build an Ecovillage / Ecotour / Adventure tour that will contribute to the culture and financial aspects of local communities.	**10M**
Q.3. Report on preservation of wildlife towards conservation and viva based on it	**10M**
Q.4. Viva	**10M**
Q.5. Journal	**05M**

Course outcome **OE/GE - Wildlife** ecotourism (VGVUOE111)
1) Learners will be able to choose career options in the field of wildlife conservation, research, photography and ecotourism.
2) Learners will appreciate the treasure of Biodiversity, its importance and hence will enhance their knowledge pertaining to contributing their best for its conservation.
3) Students can apply knowledge to overcome the issues related to wildlife conservation and management.

Recommended Resources

1. Ecology and Environment- P. D. Sharma, R. K. Rastogi Publications
2. Introduction to Ecology- R. Dajoz
3. Wildlife Laws and its Impact on Tribes- Mona Purohit, Deep and Deep Publications
4. Biodiversity- K.C. Agarwal- Agro Botanica Publications
5. Fundamentals of Ecology - Eugene P. Odum and Grey W. Barrett, Brook Cole/ Cengage learning
6. Fundamentals of Ecology - M. C. Dash, Tata McGraw Hill Company Ltd, New Delhi
7. Ecology - Mohan P. Arora, Himalaya Publishing House
8. Field Biology and Ecology -- Alen H. Benton and William E. Werner, Tata McGraw Hill ltd, New Delhi
9. Ecology: Principles and Applications – Chapman J.L Cambridge University trust
10. Ecology - Subramaniam and Others, Narosa Publishing House

Programme: F.Y.B.Sc. **Semester**: I

Course: VSC - Ornamental fisheries and management of aquarium **Course code**: VGVUSVS105

Teaching Scheme (Hrs/Week)				Continuous Internal Assessment (CIA) 40 marks					End Semester Examination	Total
L	**T**	**P**	**C**	**CIA-1**	**CIA-2**	**CIA-3**	**CIA-4**	**Lab**	**Written**	
2	-	2	4	15	15	10		-	60	100
Max. Time, End Semester Exam (Theory) -2Hrs.										

Course Objectives
1) To gain knowledge regarding the setting of freshwater aquariums.
2) To enlighten learners about the different commercially beneficial ornamental fishes.
3) To introduce the learners to the behavioral patterns, feeding habits, live food organisms and supplementary diet for ornamental fishes.

COURSE CONTENT			
Unit No.	**Module No.**	**Content**	**Lectures**
1		**Course code - VSC - Ornamental fisheries and management of aquarium**	
	I	**Identification, breeding and management of important ornamental fishes** i) Angelfish ii) Danio iii) Discus iv) Gourami v) Siamese fighter vi) Sword tail vii) Gold fish viii) Koi	**10**
	II	**Setting and design of freshwater aquarium, aquatic plants and accessories for beautification** i) Equipments - Aerators, Filters, Light ii) Aquarium plants - Amazon sword, Cork screw, Ludwigia, Cobamba, Pistia iii) Beautification of tank	**10**
	III	**Maintenance and feeding** i) Balanced aquarium ii) Formulated feed, composition and its production iii) Illness and treatment	**10**
		Total No. of Lectures	**30**

Beyond the Syllabus
Tutorial Activities: Students' Presentations, Brainstorming sessions, Group Discussions, Use of E-learning, Conferences and Hands-on training practicals

VGVUSVSP105 (SEMESTER-I)
Practical Based on VSC - Ornamental fisheries and management of aquarium

List of Experiments	
Sr. No.	**Description**
1	Identification of important ornamental fishes (Angel, Danio, Discus, Gourami, Siamese fighter, Sword tail, Gold fish, Koi).
2	Identification of important aquatic plants used in aquariums. (Amazon sword, Cork screw, Ludwigia, Cobamba, Pistia).
3	Setting up of aquariums and maintenance of aquarium fishes.
4	Estimation of temperature, pH, turbidity, hardness.

The Kelkar Education Trust's
V G Vaze College of Arts, Science and Commerce
(Autonomous)

Semester I: VSC - Ornamental fisheries and management of aquarium VGVUSVS105	**(Internal Assessment Pattern)**
	Marks: 40
1 Class Test : (Based on Theory Unit 1.2and 3)	15 marks
2 Assignment:	15 marks
3 Class Participation and Overall conduct	10 marks

Semester I: VSC - Ornamental fisheries and management of aquarium VGVUSVS105	**(Internal Class Test PaperPattern)**
Duration:	**Marks: 15**
Q.1. Fill in the blanks: (1 or 2 questions each from Unit1,2,3)	05 marks
Q.2. Write short note on:(Any two) a) Unit1 b) Unit2 c) Unit3	10 marks

Semester I: VSC - Ornamental fisheries and management of aquarium VGVUSVS105	**(Theory Paper Pattern)**
Duration:	**Marks: 60**
Q.1.A. Answer the following (Any one)- Unit 1 A) OR A)	**07 Marks**
Q.1. B) Attempt any two of the following: Unit 1 a) b) c)	**08 Marks**
Q.2.A. Answer the following: (Any one) Unit 2 A) **OR** A)	**07 Marks**
Q.2. B) Attempt any two of the following: Unit 2 a) b) c)	**08 Marks**
Q.3.A. Answer the following: (Any one)- Unit 3 A) **OR** A)	**07 Marks**
Q.3. B) Attempt any two of the following: Unit 3 a) b) c)	**08 Marks**

Q.4. Write a note on: (All questions are compulsory) a) Unit1 b) Unit2 c) Unit3	**15 Marks**

Semester I: VSC - Ornamental fisheries and management of aquarium VGVUSVSP105 **(Practical Paper Pattern)**	
Duration: 2 hours	**Marks: 50**
Q.1. Estimation of Turbidity and pH of the given water sample. **OR** Q.1. Estimation of Temperature and Hardness of the given water sample.	**15M**
Q.2. Identify the given photographs and describe: a) Aquatic plant (any two) b) Ornamental Fish (any two)	**10M**
Q.3. Submit a report on setting and maintenance of aquarium and viva voce based on it.	**10M**
Q.4. Viva	**10M**
Q.5. Journal	**05M**

Course outcome **VSC - Ornamental fisheries and management of aquarium (**VGVUSVS105)
1) Learners will learn to setup a commercial aquarium
2) Learners will be able to successfully culture and maintain an aquarium of ornamental fishes.
3) Learners will understand the behavioral patterns, feeding habits, live food organisms and supplementary diet for ornamental fishes.

Recommended Resources (VGVUSVSP105)

1. Hiscock, P. (2003). *Encyclopedia of aquarium plants* (p. 205). Barron's.
2. Alderton, D. (2019). *Encyclopedia of aquarium and pond fish*. Dorling Kindersley Ltd.
3. Farmer, G. (2020). *Aquascaping: A Step-by-Step Guide to Planting, Styling, and Maintaining Beautiful Aquariums*. Simon and Schuster.
4. Scott, P. W., Burton, J., & Taylor, K. (1991). The complete aquarium.

The Kelkar Education Trust's
V G Vaze College of Arts, Science and Commerce
(Autonomous)

Programme: F.Y.B.Sc. **Semester**: II

Course: Zoology-I **Course code**: VGVUSMZO201

Teaching Scheme (Hrs/Week)				Continuous Internal Assessment (CIA) 40 marks					End Semester Examination	Total
L	**T**	**P**	**C**	**CIA-1**	**CIA-2**	**CIA-3**	**CIA-4**	**Lab**	**Written**	
3	-	1	4	15	15	10		-	60	100
Max. Time, End Semester Exam (Theory) -2Hrs.										

Course Objectives
1. To facilitate the learning of population ecology, its dynamics and regulatory factors important for its sustenance
2. To make learners understand the importance of a balanced diet and essential nutrients of food at different stages of life.
3. To impart knowledge of health and hygiene, different diseases and create awareness of its precautionary measures and treatment amongst the students.

SEMESTER II

COURSE CONTENT			
Unit No.	**Module No.**	**Content**	**Lectures**
		Course code - Major & Minor Zoology: Population Ecology and Public Health	
1	I	**Population Ecology** Population dynamics i. Population density ii. Natality iii. Mortality iv. Fecundity v. Survivorship curves vi. Population dispersal and distribution patterns vii. Niche concept Population growth regulation i. Intrinsic mechanism – Density dependent fluctuations and oscillations ii. Extrinsic mechanism- Density independent, environmental and climate factors, population interactions Population growth pattern i. Sigmoid ii. J Shaped Human census (India) – Concept, mechanism and significance	**10**
2	II	**Nutrition and Public Health** Concept of balanced diet, dietary recommendations to a normal adult, infant, pregnant woman and aged. Malnutrition disorders – Anemia (B12 and Iron deficiency), Rickets, Marasmus, Goiter, Kwashiorkar (cause, symptoms, precaution and remedy). Constipation, piles, starvation, acidity, flatulence, peptic ulcers (cause, symptoms, precaution and remedy). Obesity (Definition and consequences). WHO and its programmes - Polio, Small pox, Malaria and Leprosy (concept, brief accounts and outcome with respect to India). BMI calculation and its significance. Blood bank – Concept and significance	**10**

3	III	**Common Human Diseases and Disorders** Stress related disorders Hypertension, Diabetes type II, anxiety, insomnia, migraine, depression (cause, symptoms, precaution and remedy) Communicable and non-communicable diseases i. Tuberculosis and Typhoid ii. Hepatitis (A, B, C), AIDS, Gonorrhea and Syphilis iii. Diseases of respiratory system- Asthma, Bronchitis. iv. Oral Cancer (Discuss cause/causative agents, symptoms, diagnostics, precaution /prevention and remedy.	**10**
		Total No. of Lectures	**30**

Beyond the Syllabus
Tutorial Activities: Students' Presentations, Brainstorming sessions, Group Discussions, Use of E-learning, Conferences and Hands-on training practicals

VGVUSMZO201 (SEMESTER- II)
Practical Based on PAPER I-Course 3

List of Experiments	
Sr. No.	**Description**
1	Calculation of Natality, Mortality, Population density from given data Estimation of population density by capture recapture method
2	Interpretation of Survivorship curve and Growth curves (Sigmoid and J shaped)
3	Qualitative estimation of Vitamin C by Iodometric method.
4	Study of microscopic structure of starch granules of different cereals (wheat, maize and jowar).
5	Estimation of maltose from brown/white bread.
6	Food adulteration Test: a) Milk adulterants (starch and glucose), methylene blue reduction Test (MBRT). b) Adulterants in Cheese, Butter, Jaggery, Ghee, Honey, Iodized Salt.
7	a) Estimation of protein content of two egg varieties. b) Study of efficacy of different antacids (any two antacids)
8	First Aid – Demonstration Practical Training for teachers and students to be conducted by the experts from Redcross, Civil defense, Civic authorities by individual institute or cluster colleges in rotation
9	BMI analysis – Measurement of Height/ Weight and calculation of BMI using formula, preparation and submission of report. (10 students/ group-50 readings/group)

The Kelkar Education Trust's
V G Vaze College of Arts, Science and Commerce
(Autonomous)

Semester II: Population Ecology and Public Health VGVUSMZO201 **(Paper I-Course 3)** **(Internal Assessment Pattern)**	
	Marks: 40
1 Class Test : (Based on Theory Unit 1, 2 and 3)	15 marks
2 Assignment:	15 marks
3 Class Participation and Overall conduct	10 Marks

Semester II: Population Ecology and Public Health VGVUSMZO201 **(Paper I-Course 3)** **(Internal Class Test Paper Pattern)**	
Duration:	**Marks:15**
Q.1. Fill in the blanks: (1 or 2 questions each from Unit 1, 2, 3)	05 marks
Q.2. Write short note on:(Any two) a) Unit1 b) Unit2 c) Unit3	10 marks

Semester II: Population Ecology and Public Health VGVUSMZO201 **(Paper I-Course 3)** **(Theory Paper Pattern)**	
Duration: 2 hours	**Marks: 60**
Q.1.A. Answer the following (Any one)- Unit 1 A) **OR** A)	**07 Marks**
Q.1. B) Attempt any two of the following: Unit 1 a) b) c)	**08 Marks**
Q.2.A. Answer the following: (Any one) Unit 2 A) **OR** A)	**07 Marks**
Q.2. B) Attempt any two of the following: Unit 2 a) b) c)	**08 Marks**
Q.3.A. Answer the following: (Any one)- Unit 3 A) **OR** A)	**07 Marks**
Q.3. B) Attempt any two of the following: Unit 3 a) b) c)	**08 Marks**
Q.4. Write a note on: (All questions are compulsory) a) Unit1 b) Unit2	**15 Marks**

c) Unit3	

Semester II: Population Ecology and Public Health VGVUSMZOP201 **(Paper I-Course 3)** **(Practical Paper Pattern)**	
Duration: 2 hours	**Marks: 50**
Q 1. Estimate Vitamin C from a given sample. **OR** Estimate Maltose content from bread. **OR** Estimate protein content from two different types of eggs	**12 marks**
Q 2. Analyze the given food sample and identify food adulterants (any 2 samples). **OR** Evaluate milk quality by Methylene Blue Reduction Test (MBRT). **OR** Determine efficacy of different antacids (any two) on acidic solution	**10 marks**
Q 3. On the basis of microscopic structure of starch granules identify different cereals (any two). **OR** Detect the adulterants present in the given milk sample (any two).	**08 marks**
Q 4. Solve the given problems (using statistical approach wherever possible) based on (Any two) a) i. Natality ii. Mortality iii. Fecundity v. Population density b) Interpretation of Survivorship curve and Growth curves	**10 marks**
Q 5. Submission of report of Body Mass Index (viva based on it)	**05 marks**
Q 6. Journal	**05 marks**

Course outcome VGVUSMZO201**: Zoology Paper I**
After the completion of the course, students will able to
study about nature of animal population, specific factors affecting its growth and its impact on the population of other life form
enquire healthy dietary habits in order to prevent risk of developing health hazards in the younger generation due to faulty eating habits.
recognize stress related problems at initial stages and thus can evaluate its remedial measures and its treatment.
to adopt relevant solutions which will lead to a psychologically strong mind set promoting positive attitude important for academics and will be able to acquire knowledge of cause, symptoms, and precautions of infectious diseases.

Recommended Resources (VGVUSMZO201)

Text Books: Common Diseases, Health and Hygiene - University Text Book of Zoology, F.Y.B.Sc. Semester II Course 4. University Press.

Reference Books

1. Economic Zoology, Biostats and Animal Behaviour: Shukla, Mathur, Upadhyay, Prasad. Rastogi Publications.
2. Begon M, Mortimer M, Thompson DJ (1996) Population Ecology: A Unified Study of Animals and Plants, 3rd Edition. Wiley-Blackwell. ISBN: 978-0-632-03478-9.
3. Rockwood LL (2006) Introduction to Population Ecology. Blackwell publishing ISBN: 978-1-4051-3263-3.
4. Sudarshan KN, Trivedi KR (2011) Population and Community Ecology. Neha Publishers & Distributors. ISBN: 978-8171692804.
5. Krishnamurthy KV (2003) An Advanced Textbook on Biodiversity – Principles and Practice, Oxford and IBH Publishing, New Delhi.
6. Singh JS, Singh SP and Gupta SR (2014) Ecology, Environmental Science and Conservation. 4th Edition. S. Chand & Company Pvt. Ltd.
7. Field Biology and Ecology -- Alen H. Benton and William E. Werner, Tata McGraw Hill ltd, New Delhi
8. Common Medical Symptoms edited - P. J. Mehta National Inblisents and Distributions
9. Parks Textbook of Preventive and Social Medicine K. Park M/S Banarasidas Bhanot Jabalpar.
10. Human Physiology – Volume I – II C. C. Chatterjee, Medical Allied agency, Kolkata.
11. Essentials of Public Health and Sanitation- Part I and Part II. All India Institute of Local Self Government.
12. Epidemiology and Management for Health Care for all. P.V.Sathe, A. P. Sathe, Popular Prakashan, Mumbai.
13. Textbook of Medical Parasitology- C. K. Jayaram Paniker. Jaypee Brothers.

14. A Treatise on Hygiene and Public Health. -B. N. Ghosh. Calcutta Scientific Publishing Company.
15. Prevention of Food Adulteration, Act 1954. Asian Law House.
16. Clinical Dietetics and Nutrition - F. P. Antia and Philip, Oxford University Press.
17. A Complete Handbook of Nature Cure - Dr. H. K. Bakru, Jaico Publishing House.
18. Dietetics - B. Srilakshmi, New Age International (P) Ltd. Publishers.
19. Nutrition: Principles and Application in Health Promotion - J. B. Lippincott Company. Philadelphia.
20. Are You Healing Yourself Mr. Executive - Dr. R. H. Dastur. IBH Publishing Company.
21. Food Nutrition and Health- Dr. Shashi Goyal, Pooja Gupta,S. Chand Publications.
22. Public Health Nutrition. Edited - Michael J. Gidney, Barrie M. Margetts, John M. Kearney and Lenore Arab. Willey Blackwell Publication.
23. Food and Nutrition – Vol. I and II - Dr. Swaminathan, Bappco Publication.
24. Textbook of Human Nutrition - MahtabBamji, Prahlad Rao. 21. Total Health by Paramjit Rana.

The Kelkar Education Trust's
V G Vaze College of Arts, Science and Commerce
(Autonomous)

Programme: F.Y.B.Sc. **Semester**: II

Course: Scientific Communication **Course code**: VGVUOE209

Teaching Scheme (Hrs/Week)				Continuous Internal Assessment (CIA) 40 marks					End Semester Examination	Total
L	**T**	**P**	**C**	**CIA-1**	**CIA-2**	**CIA-3**	**CIA-4**	**Lab**	**Written**	
3	-	1	4	15	15	10		-	60	100
Max. Time, End Semester Exam (Theory) -2Hrs.										

Course Objectives
i) To understand the importance of scientific research communication
ii) To acquire research presentation skills and implement various aspects of ethics in research publications
iii) To gain knowledge about database & research metrics

Course Content			
Unit No.	**Module No.**	**Content**	**Lectures**
		OE/GE: Scientific Communication	
1.		**Scientific Writings & Communication**	**10**
	I	Need of Science Communication	
	II	Philosophy of Science	
	III	History of Science Communication	
	IV	Channels of Science Communication	
2.		**Research Presentations & Publication Ethics**	**10**
	I	Elements of Scientific Research Paper: Abstract, Introduction, Materials & Methods, Results, Discussions, References	
	II	Review articles and Popular Science articles	
	III	Violation of publication ethics and importance of academic integrity	
	IV	Plagiarism	
3.		**Research Database & Indexing**	**10**
	I	Specialized research database: Web of Science, SCOPUS, PMC, DOAJ, PLOS, ScienceDirect, BMC SpringerNature	
	II	Web search engines: Google Scholar, ResearchGate, CrossRef, BASE, Worldwide Science, RefSeek	
	III	Scientometrics: SNIP, SJR, Impact Factor, Altmetrics	
	IV	Citation metrics: h-index, i-10 index, g-index, m-index	
		Total No. of Lectures	**30**

Beyond the Syllabus
Tutorial Activities: Students' Presentations, Brainstorming sessions, Group Discussions, Use of E-learning, Conferences and Hands-on training practicals

SZOP202 (SEMESTER- II)

VGVUOEP209 (SEMESTER II)

Practical Based on OE/GE- Scientific Communication

List of Experiments	
Sr. No.	**Description**
1	Prepare abstract (max 250 words) from the given information
2	Rewrite the given references in the prescribed formats (APA/MLA/Chicago/Harvard/AMA)
3	Evaluate the Plagiarism in the given material
4	Problems based on Scientometrics: a) Calculate SNIP from the given data b) Calculate SJR from the given data c) Calculate Impact Factor for the given journal from the given data of citations d) Calculate Altmetric from the given data
5	Problems based on Citation metrics a) Calculate h-index from the given data b) Calculate i10-index from the given data c) Calculate g-index for the given individual from the given data of citations d) Calculate m-index from the given data

Semester II: Scientific Communication VGVUOE209 **OE/GE** **(Theory Paper Pattern)**	
Duration:	**Marks: 60**
Q.1.A. Answer the following (Any one)- Unit 1 A) OR A)	**07 Marks**
Q.1. B) Attempt any two of the following: Unit 1 a) b) c)	**08 Marks**
Q.2.A. Answer the following: (Any one) Unit 2 A) OR A)	**07 Marks**
Q.2. B) Attempt any two of the following: Unit 2 a) b) c)	**08 Marks**
Q.3.A. Answer the following: (Any one)- Unit 3 A) OR A)	**07 Marks**
Q.3. B) Attempt any two of the following: Unit 3 a) b) c)	**08 Marks**
Q.4. Write a note on: (All questions are compulsory) a) Unit1 b) Unit2 c) Unit3	**15 Marks**

Semester II: Scientific Communication VGVUOEP209 **OE/GE** **(Practical Paper Pattern)**	
Duration: 2 hours	**Marks: 50**
Q.1 Prepare abstract (max 250 words) from the given information OR Rewrite the given references in the prescribed format (APA/MLA/Chicago/Harvard/AMA)	**10 marks**
Q.2 Evaluate and compare the Plagiarism in the given materials (Two paragraphs)	**05 marks**
Q.3 Calculate SNIP/SJR/Impact Factor/Altmetric from the given data (Any Two)	**10 marks**
Q.4 Calculate h-index/i-10 index/g-index/m-index from the given data (Any Two)	**10 marks**
Q.5 Viva	**10 marks**
Q.6 Journal	**05 marks**

Course outcome VGVUOE209 **OE/ GE**
After the completion of the course, students will able to
CO1: To gain knowledge about various elements of science communication
CO2: To apply scientific writing skills while preparing the manuscript for research publication
CO3: To develop a holistic approach for evaluating the research quality using indexing databases

Recommended Resources (VGVUOE209)	
Text Books	1. Histories of Science Communication - Kristian H. Nielsen 2. The Science of Storytelling - W. Storr 3. Research Methodology: Methods & Techniques - C. R. Kothari
Reference Books	1. Handbook of Research methodology - Dr. Shanti Bhushan Mishra, Dr. Shashi Alok 2. James Cook University : Using Research Indicators Getting Started - Using Research Indicators - Library Guides at James Cook University (jcu.edu.au)

The Kelkar Education Trust's
V G Vaze College of Arts, Science and Commerce
(Autonomous)

Programme: F.Y.B.Sc. **Semester**: II

Course: Wildlife Forensics **Course code**: VGVUSZSE201

Teaching Scheme (Hrs/Week)				Continuous Internal Assessment (CIA) 40 marks					End Semester Examination	Total
L	**T**	**P**	**C**	**CIA-1**	**CIA-2**	**CIA-3**	**CIA-4**	**Lab**	**Written**	
2	-	2	4	15	15	10		-	60	100
Max. Time, End Semester Exam (Theory) -2Hrs.										

Course Objectives
1. To understand and clarify the concepts of forensic science and its disciplines and will know how to properly document and process a crime scene where wildlife may be the victim.
2. To understand the relevant laws in the investigation of wildlife crime
3. To understand the relevance of pathology in forensic cases relating to wildlife.

SEMESTER II

Course Content			
Unit No.	**Module No.**	**Content**	**Lectures**
		SEC: Wildlife Forensics	
1.		**Wildlife crime scene processing**	**10**
	I II III IV	Introduction and History of Forensic Science Evidence Identification, Collection, Preservation, Processing, Collection of impression Evidence Forensic Entomology Basics of forensic entomology. Insects of forensic importance. Collection of entomological evidence during death investigations.	
2.		**Wildlife crime**	**10**
	I	Wildlife Trafficking, Illegal use of pesticides/hazardous wastes, poaching/ illegal trade in wildlife International Frameworks for Combating Wildlife Trafficking: The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) the international trade framework, Challenges for Law Enforcement in Wildlife crime. Mechanisms for incentivizing community conservation and reducing wildlife trafficking, Green militarization, Intelligence-driven and hotspot policing Illegal trading in wildlife items, such as skin, fur, bone, horn, teeth.	
3.		**Forensic pathology**	**10**
	I	Animal legislation relevant to wildlife forensic pathology; animal welfare; wildlife conservation; international wildlife trade. The function and purpose of wildlife post-mortem examinations (necropsies), Considerations in different vertebrate and invertebrate species, facilities and equipment The role of wildlife forensic pathologist (ethologists, ecologists)	

		Common body fluids. Composition and functions of blood. Collection and preservation of blood evidence. Distinction between human and non-human blood. Composition, functions and forensic significance of saliva, sweat, milk and urine. Tests for their identifications.	
		Total No. of Lectures	**30**

Beyond the Syllabus
Tutorial Activities: Students' Presentations, Brainstorming sessions, Group Discussions, Use of E-learning, Conferences and Hands-on training practicals

The Kelkar Education Trust's
V G Vaze College of Arts, Science and Commerce
(Autonomous)

VGVUSZSE201(SEMESTER II)

Practical Based on SEC: Wildlife Forensics

List of Experiments	
Sr. No.	**Description**
1	Documenting investigation of a suspected wildlife crime scene.
2	Sample collection techniques at suspected crime sites and its analysis.
3	Packaging, transportation, and storage of collected samples.
4	Determination of postmortem interval by using insects as evidence
5	Dissection of insect larvae to study the morphology of forensically important flies
6	Identification of forensically important beetles and carrion flies

Semester II: Wildlife Forensics (VGVUSZSE201) – SEC (Internal Assessment Pattern)	
	Marks: 40
1 Class Test : (Based on Theory Unit 1.2and 3)	15 marks
2 Assignment:	15 marks
3 Class Participation and Overall conduct	10 marks

Semester II: Wildlife Forensics (VGVUSZSE201) – SEC (Internal Class Test Paper Pattern)	
Duration:	**Marks:15**
Q.1. Fill in the blanks: (1 or 2 questions each from Unit 1,2,3)	05 marks
Q.2. Write short note on:(Any two) a) Unit1 b) Unit2 c) Unit3	10 marks

The Kelkar Education Trust's
V G Vaze College of Arts, Science and Commerce
(Autonomous)

Semester II: Wildlife Forensics (VGVUSZSE201) – SEC (Theory Paper Pattern)	
Duration:	**Marks: 60**
Q.1.A. Answer the following (Any one)- Unit 1 A) **OR** A)	**07 Marks**
Q.1. B) Attempt any two of the following: Unit1 a) b) c)	**08 Marks**
Q.2.A. Answer the following: (Any one) Unit 2 A) **OR** A)	**07 Marks**
Q.2. B) Attempt any two of the following: Unit 2 a) b) c)	**08 Marks**
Q.3.A. Answer the following: (Any one)- Unit 3 A) **OR** A)	**07 Marks**
Q.3. B) Attempt any two of the following: Unit 3 a) b) c)	**08 Marks**
Q.4. Write a note on: (All questions are compulsory) a) Unit1 b) Unit2 c) Unit3	**15 Marks**

Semester II: Wildlife Foresnsics (VGVUSZSE201) - SEC (Practical Paper Pattern)	
Duration: 2 hours	**Marks: 50**
Q.1 Determination of postmortem interval by using insects as evidence. **OR** Sample collection techniques at suspected crime sites and its analysis.	**12 marks**
Q.2 Dissection of insect larvae to study the morphology of forensically important flies **OR** Demonstration of Packaging, transportation, and storage of collected samples	**08 marks**
Q 3. Identification: a) Carrion flies b) Beetles	**05 marks**
Q.3 Report evaluation on Documenting investigation of a suspected wildlife crime scene	**10 marks**
Q.4 Viva -voce	**10 marks**
Q 5. Journal	**05 Marks**

Course outcome (VGVUSZSE201) SEC
After the completion of the course, students
Will understand the procedures and protocols that can be used when processing a wildlife crime scene
Will understand the distinct features of wildlife legislation in the country, state or province.
Will understand the relevance of pathological investigations in forensic work.

(VGVUSZSE201) Wildlife Forensics - Recommended Resources	SEC
Text Books	1. Villet, M. H. (2010). Forensic Entomology: The Utility of Arthropods in Legal Investigations. JH Byrd & JL Castner (Eds.). 2. Animal Abuse and Unlawful Killing: Forensic Veterinary pathology.
Reference Books	1. Entomology and Death, a Procedural Guide Author: Neal H. Haskell. 2. "Introduction to Veterinary and Comparative Forensic Medicine" (Blackwell, 2007). 3. "Wildlife Forensic Investigation: Principles and Practice" (Taylor and Francis/CRC, 2013).

The Kelkar Education Trust's
V G Vaze College of Arts, Science and Commerce
(Autonomous)

Syllabus Prepared by:
1. **Dr. Vinod R. Ragade:** Chairperson, Syllabus Committee Head, Dept of Zoology & Associate Professor, KET'S V. G. Vaze College (Autonomous), Mulund East, Mumbai.
2. Dr. Preetha Achary: Assistant Professor, Dept. of Zoology, KET'S V. G. Vaze College (Autonomous), Mulund East, Mumbai).
3. Ms. Veena Menon: Assistant Professor, Dept. of Zoology, KET'S V. G. Vaze College (Autonomous), Mulund East, Mumbai.
4. Dr. Abhay Morajkar Assistant Professor, Dept. of Zoology, KET'S V. G. Vaze College (Autonomous), Mulund East, Mumbai.
5. Mr.Akshay Bagwe Assistant Professor, Dept. of Zoology, KET'S V. G. Vaze College (Autonomous), Mulund East, Mumbai.
6. Dr. Sarika Bansode Assistant Professor, Dept. of Zoology, KET'S V. G. Vaze College (Autonomous), Mulund East, Mumbai.
7. Dr. Prachi Dandge, Assistant Professor, Dept. of Zoology, KET'S V.G.Vaze College (Autonomous), Mulund East, Mumbai.

****