St. Albert's College (Autonomous)

ZOO01-ZOO1CRT 0119 ANIMAL DIVERSITY – NON-CHORDATA

I. Course Instructor

Name	Sem, Programme & Batch	Email
Prof. K. J. Benny	B.Sc. Zoology Semester I 2019-20	bennykj@alberts.edu.in
Mrs. Nimila P. J.	B.Sc. Zoology Semester I 2019-20	nimilapj@alberts.edu.in

II. Duration of Course:

No	Activity	Duration
1	Contact hours	32 (Including assignments)
2	Assessment (CAE & ESE)	4
	Total	36
	Remedial Sessions/Peer Tutoring/Tutorials (need based & Optional)	0

III. Course Objectives:

· Improving the knowledge about criteria for animal classification.
· Improving the knowledge of animals about their special adaptations and evolutionary relationship.
· Scientific study of their nature of habitat.
· Improving information about morphology and anatomy of animals.
· Understanding the arrangement of organism or groups of organism in distinct categories in accordance with particular and well established plan.
· Explanation of unity in diversity of organism.
· Studying specific and scientific names to organism.
· Collecting information about useful and harmful animals helps in understanding the nature of habitat.

IV. Course Delivery Plan

This course is a course requiring lot of student centric learning processes. The teaching methods include lectures, discussions, Assignments/Seminars etc.

Topics	Session No & Date(s)	Methodology and Duration (2 hours per day)
These are the topics to be covered in the modules **MODULE I SYSTEMATICS** **Systematic, Taxonomy, Phylogeny [Brief account], Approaches to taxonomy, Zoological nomenclature, International Code of Zoological Nomenclature (ICZN), Law of Priority. Five Kingdom Classification; Linnaean classification, Basis for Animal kingdom classification [Levels of organization, Symmetry, Coelom].** **Modern Tools- Molecular taxonomy, Bar coding.**	**06-Jun-19** **13-Jun-19**	**Lectures**
MODULE II: PROTISTAN DIVERSITY **Type: Paramecium: morphology and structural organization [as revealed by compound microscopy]; locomotion, nutrition, excretion, osmoregulation and reproduction; conjugation in detail.** **Characteristic features and classification of Kingdom Protista down to phyla** **Phylum Sarcomastigophora examples: Amoeba, *Noctiluca*, and *Trichonympha*** **Phylum Apicomplexa [=Sporozoa] example: *Plasmodium*** **Phylum Ciliophora examples: *Vorticella, Ephelota*** **General Topics:** **Parasitic protists (diseases mode of transmission and prophylactic measures) - *Entamoeba, Trypanosoma, Plasmodium* (detailed account of life cycle), *Leishmania.***	**27-Jun-19** **04-Jul-19** **11-Jul-19**	**Lectures**
MODULE III: KINGDOM ANIMALIA **Outline classification of Kingdom Animalia** **Three branches - Mesozoa, parazoa and Eumetazoa** **Mesozoa: Phylum Orthonectida - eg. *Rhopalura* (mention 5 features)**	**18-Jul-19**	**Lectures**

Parazoa: Phylum Placozoa – Eg. *Trycoplax adherens* Phylum Porifera – Classification upto classes; Mention gemmules Class I- Calcarea. Eg.*Sycon.*, Class II – Hexactinellida .Eg.*Euplectella.* Class III - Demospongia Eg.*Cliona.* General Topics 1. Canal system in sponges. Eumetazoa Phylum Coelenterata -Classification upto classes Class I - Hydrozoa Eg. Eg. Obelia - mention Metagenesis Class II- Scyphozoa Eg. *Rhizostoma.* Class III- Anthozoa Eg. *Metridium.* General Topics: Coral and coral reefs with special reference to conservation of reef fauna. Polymorphism in Coelenterates Phylum Ctenophora - Eg. *Pleurobrachia.*	25-Jul-19 01-Aug-19 08-Aug-19	
MODULE IV Phylum Platyhelminthes Salient features; classification up to classes Class I - Turbellaria. Eg. *Planaria.* Class II –Trematoda Eg. *Fasciola* Class III- Cestoda Eg. *Taenia saginata.* General Topics: Life history of *Fasciola hepatica.* Platyhelminth parasites of Man and Dog (*Schistosoma, Taenia solium, Echinococcus*) Phylum Nemathelminthes (Nematoda) Salient features, classification up to classes Class: Phasmidia Eg. *Enterobius* Class: Aphasmidia Eg. *Trichinella* General Topic Pathogenic nematodes in man. (*Wuchereria bancrofti, Ascaris lubricoides,* *Ancylostoma duodenale, Trichinella trichiuris*) History and multidisciplinary foundation of Social work education, Field work, supervision and Recording-Need and importance Phylum Annelida: Salient features, Classification upto classes.	22-Aug-19 29-Aug-19 05-Sep-19 26-Sep-19 03-Oct-19 10-Oct-19 17-Oct-19	Lectures

Class I- Archiannelida Eg. *Polygordius* Class II -Polychaeta Eg. *Chaetopterus* ClassIII- Oligochaeta Eg. *Megascolex* Class IV- Hirudinea Eg. *Hirudinaria*		
	24-Oct-19	
MODULE V		
Phylum Onychophora	31-Oct-19	
Eg. *Peripatus* (Mention its affinities). Phylum Arthropoda Salient features, Classification upto classes Type: Prawn –*Fenneropenaeus* (*Penaeus*) Sub Phylum - Trilobitomorpha Class -Trilobita (mention the salient features). Eg.*Triarthrus* – A trilobite (extinct) Subphylum –Chelicerata Class 1 Merostomata (Xiphosura) (Eg. *Limulus*) Class 2.Arachnida (Eg., Palamnaeus- *Scorpion*) Class 3 Pycnogonida (Eg. Pycnogonum – Sea spider) Subphylum- Crustacea Class 1 Branchiopoda Eg. *Daphnia* Class 2 Ostracoda Eg. Cypris -seed shrimp Class 3 Copepoda Eg. *Cyclops* Class 4 Remipedia Eg. *Speleonectes* (eyeless crustacean seen in caves) Class 5.Branchiura Eg.,*Argulus* (common fish louse) Class 6 Cirripedia Eg. *Sacculina* (parasitic castrator of crabs) Class 7 Malacostraca Eg. *Squilla* (spot tail mantis shrimp) Subphylum- Uniramia Class 1 Chilopoda Eg. *Scolopendra* – (Centipede) Class 2 Symphyla Eg. *Scutigerella* – (garden centipedes or pseudocentipedes) Class 3 Diplopoda Eg. *Spirostreptus*- (Millipede) Class 4 Pauropoda Eg. *Pauropus* Class 5 Hexapoda (Insecta) Eg. *Bombyx mori* – (silk moth)		
MODULE IV Phylum Mollusca Salient features, Classification upto classes Class I- Apalcophora Eg. *Neomenia* Class II- Monoplacophora Eg. *Neopilina* Class III Amphineura Eg. *Chiton* Class IV Gastropoda Eg. *Aplysia* Class V Scaphopoda Eg. *Dentalium* Class VI Pelecypoda (Bivalvia) Eg. *Pinctada*		

Class VII Cephalopoda Eg. *Sepia* Phylum Echinodermata Classification upto classes Class I- Asteroidea Eg. *Astropecten* Class II- Ophiuroidea Eg. *Ophiothrix* Class III- Echinoidea Eg. *Echinus* Class IV- Holothuroidea Eg. *Holothuria* Class V – Crinoidea Eg. *Antedon* General Topics 1. Water vascular system in Echinodermata Phylum Hemichordata: Eg. *Balanoglossus* Minor Phyla Chaetognatha Eg. *Sagitta* Sipunculida Eg. *Sipunculus*		

V. Innovative Learning Programmes

Name of Programme	Duration	Type	Proposed Time

VI. Assignments and Seminars

The following Assignment needs to be submitted as individual assignments.

Number	Topics	Activity	Submission Deadline
Assignment	Assignment on given topic	Preparation of assignment	Thursday of 5th Week of Course

Note: Failure to submit the assignment on the date mentioned will result in 0 marks for the assignment. Requests for extension of dates for submission not entertained.

VII. Attendance (one component in class participation):

95-100%	5
90-95%	4
85-90%	3
80-85%	2
75-80%	1
<75	Not eligible for appearing for ESE

VIII. Required reading:

- Barnes, R.D. (1987). Invertebrate Zoology, W.B. Saunders, New York.
- Barrington, E.J.W.(1967). Invertebrate Structure and function. ELBS and Nelson, London.
- Dhami, P.S. and Dhami, J.K. (1979). Invertebrate Zoology. S. Chand and Co. New Delhi.
- Ekamberanatha Ayyar M. (1990) A Manual of Zoology, Volume I. Invertebrate Part I andpart II.
- S. Viswanathan Printers & Publishers. Pvt. Ltd.
- Groove, A.J. and Newell, G.E. (1974). Animal Biology – Indian Reprint, University Book Stall, New Delhi.
- Hyman, L.H. (1942) The Invertebrate volumes. McGraw-Hill.
- James R.D. (1987). Invertebrate Zoology, W.B. Saunders, New York.
- Jordan E.L and Verma P.S (2007). Invertebrate Zoology. S.Chand and Co.New Delhi.
- Joy P.J., George Abraham K., Aloysius M. Sebastian and Susan Panicker (Eds) (1998). Animal Diversity, Zoological Society of Kerala, Kottayam
- Kapoor, V.C. (1994). Theory and Practice of Animal Taxonomy, Oxford and IBH Publishing Co., New Delhi.
- Kotpal.R. L., 1988-92 (All series). Protozoa, Porifera, Coelentereta, Helminthes, Annelida, Arthropoda, Mollusca, Echinodermata, Rastogi Publishers, Meerut.
- Kotpal R.L. Agarwal S.K. and R.P. Khetharpal (2002). Modern Text Book of Zoology. Rastogi Publications, Meerat – 250 002.
- Marshall, A.J. and Williams, W.D. (1972). Text Book of Zoology Vol. Invertebrates (ELBS and Macmillan, London).
- Mayr, E. (1980). Principles of Systematic Zoology (Tata McGraw Hill Publishing
- Co., New Delhi)
- Parker and Hanswell, 2004, Text Book of Zoology,Vol I (Invertebrate), 7th Edition, A.Z.T,B.S. Publishers and Distributors, New Delhi – 110 051
- Pechenik J A (2005) Biology of Invertebrates, (Tata McGraw Hill Publishing Co., NewDelhi.)
- Prema A.K., Joseph M.L. and Terrence Rebello V. (Eds) (2011). Invertebrate Diversity of Kerala. Zoological Society of Kerala, Kottayam.

Thomas A P (Editor) 2010 The Invertebrates, Green leaf publications Kottayam

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St. Albert's College (Autonomous)

ZOO2CRT0119 ANIMAL DIVERSITY CHORDATA

I. Course Instructor

Name	Sem, Programme & Batch	Email
Prof. K. J. Benny	B.Sc. Zoology Semester II 2019-20	bennykj@alberts.edu.in
Mrs. Nimila P. J.	B.Sc. Zoology Semester II 2019-20	nimilapj@alberts.edu.in

II. Duration of Course:

No	Activity	Duration
1	Contact hours	32 (Including assignments)
2	Assessment (CAE & ESE)	4
	Total	36
	Remedial Sessions/Peer Tutoring/Tutorials (need based & Optional)	0

III. Course Objectives:

- In depth knowledge on the diversity of chordates and their systematic position.
- Acquiring knowledge about the distinguishing characteristics and classification of the
- major vertebrate phyla.
- Will be aware of the economic importance of some classes.
- Understanding the evolutionary importance of selected chordate groups.
- In depth knowledge on the diversity of chordates and their systematic position.
- Acquiring knowledge about the distinguishing characteristics and classification of the
- major vertebrate phyla.

IV. Course Delivery Plan

This course is a course requiring lot of student centric learning processes. The teaching methods include lectures, discussions, field based assignments, Assignments/Seminars etc.

Topics	Session No & Date(s)	Methodology and Duration (2 hours per day)
These are the topics to be covered in the modules MODULE I Introduction General Characters and outline classification of Chordata up to class Origin of Chordates – mention theories in brief Protochordates: General characters and Classification 1. Sub phylum: Urochordata Class I Larvacea Eg. *Oikopleura* Class II Ascidiacea Eg: *Ascidia* (Mention Retrogressive Metamorphosis) Class III Thaliacea Eg: *Doliolum* 2. Sub phylum:Cephalochordata Example - *Amphioxus* (Structure and affinities)	14-Nov-19 21-Nov-19 28-Nov-19 05-Dec-19	Lectures
MODULE II Sub phylum: Vertebrata General characters and Classification 4. Division 1– Agnatha Class I Ostracodermi Eg: *Cephalaspis* Class II Cyclostomata Eg: *Petromyzon* Division 2 – Gnathostomata Super class Pisces General Characters and	12-Dec-19 19-Dec-19 09-Jan-20	Lectures

Classification Class: Chondrichthyes – General Characters Sub class – Elasmobranchl Eg: *Narcine* Sub class – Holocephali Eg: *Chimaera* Class: Osteichthyes – General Characters Sub class – Choanichthyes Order 1 Crossopterigii(Coelocanths) Eg: *Latimeria*(Evolutionary Significance) Order 2 Dipnoi Eg: *Lepidosiren* – Distribution, affinities and systematic position of lung fishes. Sub class: - Actinopterygii Super order 1. Chondrostei Eg: *Acipencer* Super order 2. Holostei Eg: *Amia* Super order 3. Teleostei Eg: Sardine General topics 1. Accessory respiratory organs in fishes. 2. Parental care in fishes. 3. Scales in fishes. 4. Migration in fishes	16-Jan-20 23-Jan-20 30-Jan-20 06-Feb-20 13-Feb-20	
MODULE III Super class: Tetrapoda General characters, Classification up to Orders. Class Amphibia - Type Frog (*Euphlyctis hexadactylus*) Order I Anura Eg*: Hyla* Order II Urodela Eg: *Amblystoma* (mention axolotl larva and Paedomorphosis /neotony) Order III Apoda Eg: *Ichthyophis.* Class Reptilia Sub class I: Anapsida Order Chelonia Eg: *Chelone* Sub class II: Parapsida Eg: *Ichthyosaurus* Sub class III: Diapsida Order I Rhynchocephalia Eg: *Sphenodon* Order II Squamata Eg: *Chamaleon* Order III. Crocodilia Eg..*Crocodylus* Sub class IV: Synapsida Eg: *Cynognathus* General topic Identification of poisonous and non-poisonous snak Class Aves Sub class I: Archeornithes Eg: *Archaeopteryx* (Affinities)	20-Feb-20 27-Feb-20 05-Mar-20 12-Mar-20	Lectures

Sub class II: Neornithes Super order I: Palaeognathe Eg: *Struthio* Super order II: Neognathe Eg: Brahminy kite General topics 1. Migrations in birds 2. Flight adaptations in birds MODULE IV Class Mammalia Sub class I: Prototheria Eg: Echidna, *Ornithorhychus* Sub class II: Metatheria Eg: *Macropus* Sub class III: Eutheria Order 1 Insectivora Eg: *Talpa* Order 2 Dermoptera Eg: *Galeopithecus* Order 3 Chiroptera Eg: *Pteropus* Order 4 Primates Eg: *Loris* Order 5 Carnivora Eg: *Panthera* Order 6 Edentata Eg: *Armadillo* Order 7 Pholidota Eg: *Manis* Order 8 Proboscidea Eg: *Elephas* Order 9 Hydracoidea Eg: *Procavia* Order 10 Sirenia Eg: *Dugong* Order 11 Perissodactyla Eg:*Rhinoceros* Order 12 Artiodactyla Eg: *Camelus*-mention ruminant stomach Order 13 Lagomorpha Eg: *Oryctolagus* Order 14 Rodentia Eg: *Hystrix* (Porcupine) Order 15 Tubulidentata Eg: *Orycteropus* Order 16 Cetacea Eg: *Delphinus* General topics 1. Aquatic Mammals and their adaptations.		

V. Innovative Learning Programmes

Name of Programme	Duration	Type	Proposed Time

VII. Assignments and Seminars

The following Assignment needs to be submitted as individual assignments.

Number	Topics	Activity	Submission Deadline
Assignment	Assignment on given topic	Preparation of assignment	Thursday of 5th Week of Course

Note: Failure to submit the assignment on the date mentioned will result in 0 marks for the assignment. Requests for extension of dates for submission not entertained.

VIII. Attendance (one component in class participation):

95-100%	5
90-95%	4
85-90%	3
80-85%	2
75-80%	1
<75	Not eligible for appearing for ESE

IX. Required reading:

- Ekambaranatha Iyer (2000), A Manual of Zoology Vol. II .S. Viswanathan and Co.
- Jhingran (1977), Fish and Fisheries of India, Hindustan Publishing Co.
- Jordan E L and P.S. Verma, (2002), Chordate Zoology, S. Chand and Co. New Delhi
- Joy P.J., George Abraham K.,Aloysius M. Sebastian (1998). Animal Diversity. Zoological Society of Kerala, Kottayam
- Kotpal R.L. (2000), Modern Text Book of Zoology, Vertebrates, Rastogi Publications, Meerut.– 250 002.
- Nigam, H. C. (1983). Zoology of Chordates, Vishal Publications, Jalandhar - 144008

- Nigam, H.C. and Sobti (2000), Functional Organization of Chordates, Shoban Lal
- Nagin Chand and Co., New Delhi.
- Parker and Hanswell, (2004), Text Book of Zoology, Vol II (Chordata),

- A.Z.T,B.S. Publishers and Distributors, New Delhi – 110 051
- Pough H. (2009) Vertebrate life, VIII Edition, Pearson International
- Prema A.K., Terrence V.R. and Mini K.D.(Eds.) (2011). Chordate Diversity of Kerala, Zoological Society of Kerala, Kottayam
- Thomas A. P. (Editor) (2010) Chordata .Green leaf publications Kottayam
- Young J.Z.(2004), The life of Vertebrates, Oxford University Press (Third Ed.) India

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St. Albert's College (Autonomous)

Z0001-ZOO3CRT0-117 ANIMAL DIVERSITY –CHORDATA

I. Course Instructor

Name	Sem, Programme & Batch	Email
Dr. Vincent Terrence Rebello	B.Sc. Zoology Semester III 2019-2020	vincentterrence@alberts.edu.in
Prof. K. J. Benny	B.Sc. Zoology Semester III 2019-2020	bennykj@alberts.edu.in
Mrs. Nimila P. J.	B.Sc. Zoology Semester III 2019-2020	nimilapj@alberts.edu.in

II. Duration of Course:

No	Activity	Duration
1	Contact hours	50 (Including assignments)
2	Assessment (CAE & ESE)	4
	Total	54
	Remedial Sessions/Peer Tutoring/Tutorials (need based & Optional)	0

III. Course Objectives:

- To acquire in depth knowledge on the diversity of chordates and their systematic position.
- To make them aware of the economic importance of some classes.
- To understand the evolutionary importance of selected chordate groups

IV. Course Delivery Plan

This course is a course requiring lot of student centric learning processes. The teaching methods include lectures, discussions, Assignments/Seminars etc.

Topics	Session No & Date(s)	Methodology and Duration ((2 hours per day)
MODULE I **Introduction** **General Characters and outline classification of Chordata up to class, Origin of Chordates – mention theories in brief** **Protochordates:General characters and Classification 2 Hrs** **1. Sub phylum: Urochordata** **Class I Larvacea Eg. *Oikopleura*** **Class II Ascidiacea Eg: *Ascidia* (Mention Retrogressive Metamorphosis) Class III Thaliacea Eg: *Doliolum*** **2. Sub phylum: Cephalochordata**	07-Jun-19 10-Jun-19 11-Jun-19 14-Jun-19 17-Jun-19 18-Jun-19 21-Jun-19 24-Jun-19 25-Jun-19 28-Jun-19 01-Jul-19	Lectures Lectures
MODULE II **3. Sub phylum: Vertebrata General characters and Classification 2 Hrs** **4. Division 1– Agnatha** **Class I Ostracodermi Eg: *Cephalaspis*** **Class II Cyclostomata Eg: *Petromyzon*** **Division 2 – Gnathostomata 10 Hrs** **Super class Pisces General Characters and Classification** **Class: Chondrichthyes - General Characters Sub class – ElasmobranchI Eg: *Narcine* Sub class - Holocephali Eg: *Chimaera*** **Class: Osteichthyes - General Characters Sub class – Choanichthyes** **Order 1 Crossopterigii(Coelocanths) Eg: *Latimeria*(Evolutionary Significance)** **Order 2 Dipnoi Eg: *Lepidosiren* - Distribution, affinities and systematic position of lung fishes.** **Sub class: - Actinopterygii** **Super order 1. ChondrosteI Eg: *Acipencer*** **Super order 2. Holostei Eg: *Amia*** **Super order 3. Teleostei Eg: Sardine** **General topics** **1. Accessory respiratory organs in fishes.** **2. Parental care in fishes.** **3. Scales in fishes.**	02-Jul-19 05-Jul-19 08-Jul-19 09-Jul-19 12-Jul-19 16-Jul-19 19-Jul-19 22-Jul-19 23-Jul-19 26-Jul-19 29-Jul-19	Lectures

4. Migration in fishes		
MODULE III **Super class: Tetrapoda General characters, Classification up to Orders 11 Hrs Class Amphibia - Type Frog (*Euphlyctis hexadactylus*)** **Order I Anura Eg: *Hyla*** **Order II Urodela Eg: *Amblystoma* (mention axolotl larva and Paedomorphosis /neotony)** **Order III Apoda Eg: *Ichthyophis.***	30-Jul-19 02-Aug-19 05-Aug-19 06-Aug-19 16-Aug-19 19-Aug-19 20-Aug-19 26-Aug-19	Lectures
Class Reptilia 4 Hrs **Sub class I: Anapsida** **Order Chelonia Eg: *Chelone*** **Sub class II: Parapsida Eg: *Ichthyosaurus*** **Sub class III: Diapsida** **Order I Rhynchocephalia Eg: *Sphenodon*** **Order II Squamata Eg: *Chamaleon*** **Order III. Crocodilia Eg..*Crocodylus*** **Sub class IV: Synapsida Eg: *Cynognathus*** **General topic** **Identification of poisonous and non-poisonous snakes** **Class Aves 5 Hrs** **Sub class I: Archeornithes Eg: *Archaeopteryx* (Affinities)** **Sub class II: Neornithes** **Super order I: Palaeognathe Eg: *Struthio*** **Super order II: Neognathe Eg: Brahminy kite** **General topics** **1. Migrations in birds** **2. Flight adaptations in birds**	27-Aug-19 30-Aug-19 02-Sep-19 03-Sep-19 06-Sep-19 16-Sep-19 17-Sep-19	Lectures
MODULE IV **Class Mammalia Type: Rabbit (*Oryctolagus cuniculus*) 17** **Brief mention of general characters and classification up t** **with example. (Mention any five salient features of each or** **detailed accounts of examples are not necessary)** **Sub class I: Prototheria Eg: Echidna, *Ornithorhychus*** **Sub class II: Metatheria Eg: *Macropus*** **Sub class III: Eutheria** **Order 1 Insectivora Eg: *Talpa*** **Order 2 Dermoptera Eg: *Galeopithecus*** **Order 3 Chiroptera Eg: *Pteropus*** **Order 4 Primates Eg: *Loris*** **Order 5 Carnivora Eg: *Panthera*** **Order 6 Edentata Eg: *Armadillo*** **Order 7 Pholidota Eg: *Manis*** **Order 8 Proboscidea Eg: *Elephas***	20-Sep-19 23-Sep-19 24-Sep-19 27-Sep-19 30-Sep-19 01-Oct-19 04-Oct-19 11-Oct-19 14-Oct-19 15-Oct-19 18-Oct-19 25-Oct-19 28-Oct-19 29-Oct-19	Lectures

Order 9 Hydracoidea Eg: *Procavia* Order 10 Sirenia Eg: *Dugong* Order 11 Perissodactyla Eg:*Rhinoceros* Order 12 Artiodactyla Eg: *Camelus*-mention ruminant sto Order 13 Lagomorpha Eg: *Oryctolagus* Order 14 Rodentia Eg: *Hystrix* (Porcupine) Order 15 Tubulidentata Eg: *Orycteropus* Order 16 Cetacea Eg: *Delphinus* General topics 1. Dentition in Mammals 2. Aquatic Mammals and their adaptations.		

V. Innovative Learning Programmes

Name of Programme	Duration	Type	Proposed Time

VI. Assignments and Seminars

The following Assignment needs to be submitted as individual assignments.

Number	Topics	Activity	Submission Deadline
Assignment	Assignment on given topic	Preparation of assignment	Thursday of 5th Week of Course

Note: Failure to submit the assignment on the date mentioned will result in 0 marks for the assignment. Requests for extension of dates for submission not entertained.

VII. Attendance (one component in class participation):

95-100%	5
90-95%	4
85-90%	3
80-85%	2

75-80%	1
<75	Not eligible for appearing for ESE

VIII. Required reading:

1. Ekambaranatha Iyer (2000), A Manual of Zoology Vol. II .S. Viswanathan and Co.

2. Jhingran (1977), Fish and Fisheries of India, Hindustan Publishing Co.

3. Jordan E L and P.S. Verma, (2002), Chordate Zoology, S. Chand and Co. New Delhi

4. Joy P.J., George Abraham K.,Aloysius M. Sebastian (1998). Animal Diversity. Zoological Society of Kerala, Kottayam

5. Kotpal R.L. (2000), Modern Text Book of Zoology, Vertebrates, Rastogi Publications, Meerut.– 250 002.

6. Nigam, H. C. (1983). Zoology of Chordates, Vishal Publications, Jalandhar - 144008

7. Nigam, H.C. and Sobti (2000), Functional Organization of Chordates, Shoban Lal Nagin Chand and Co., New Delhi.

8. Parker and Hanswell, (2004), Text Book of Zoology, Vol II (Chordata), A.Z.T,B.S. Publishers and Distributors, New Delhi – 110 051

9. Pough H. (2009) Vertebrate life, VIII Edition, Pearson International

10. Prema A.K., Terrence V.R. and Mini K.D.(Eds.) (2011). Chordate Diversity of Kerala, Zoological Society of Kerala, Kottayam

11. Thomas A. P. (Editor) (2010) Chordata .Green leaf publications Kottayam

12. Young J.Z.(2004), The life of Vertebrates, Oxford University Press (Third Ed.) India Ed.

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St. Albert's College (Autonomous)

ZOO5CRT0117 ENVIRONMENTAL BIOLOGY AND HUMAN RIGHTS

I. Course Instructor

Name	Sem, Programme & Batch	Email
Dr. M. L. Joseph	B.Sc. Zoology Semester 5 2019-2020	joesphml@alberts.edu.in

II. Duration of Course:

No	Activity	Duration
1	Contact hours	50(Including assignments)
2	Assessment (CAE & ESE)	4
	Total	**54**
	Remedial Sessions/Peer Tutoring/Tutorials (need based & Optional)	7

III. Course Objectives:

- The student will be able to understand the basic concepts of Environmental Sciences, Ecosystems, Population and sustainable development
- The student will be aware of natural resources, their protection, conservation, and the factors polluting the environment, their impacts and control measures.
- The student will have a comprehensive idea about the basic concepts of environmental toxicology, their impact on human health and remedial measures
- Student will attain solemn perception regarding various environmental issues and their remedial measures
- The student will develop consciousness regarding importance of Biodiversity and its conservation strategies
- The student shall conceive the real sense of Human rights – its concepts & manifestations

IV. Course Delivery Plan

This course is enables the student to understand the basic concepts of Environmental Sciences,Ecosystems, Population and sustainable development and also in the awareness of natural resources and their protection. The teaching methods will include lectures, power point presenations and cross over learning.

Topics	Session No & Date(s)	Methodology and Duration
Topics	Session No & Date(s)	Methodology and Duration
These are the topics to be covered in the modules		
Basic concepts of ecosystem Components of ecosystem: Abiotic (Sunlight, temperature, soil, water, atmosphere) and Biotic components (Producers, consumers,	06-06-2019 07-06-2019 10-06-2019 11-06-2019	Lectures

decomposers), Ecological pyramid- number, biomass, energy, Functions of ecosystem: Productivity-Food chain-Food web- Energy flow Laws of Thermodynamics. Types of Ecosystem: Terrestrial-Forest-Grassland-Desert, Aquatic-Marine Fresh water, Wetland &Biome Concept of limiting factors: Liebig's and Shelford's laws of limiting factors. Concept of population: Population attributes- Population growth forms, Basic concepts of growth rates, density, natality, mortality, growth curves Animal interactions: Positive-Commensalism-Mutualism Protocooperation, Negative-Predation-Characteristics of a community: Species diversity- richness, evenness, stratification, dominance, ecological indicators, Ecotone and Edge effect, Keystone species, Concepts of Ecological Niche and Guild, Ecological succession, community evolution- climax.	12-06-2019 13-06-2019 18-06-2019 19-06-2019 20-06-2019 21-06-2019	Power point presentations
Global Environmental Issues: Air pollution and Climate change, Greenhouse effect, Global warming, Ozone depletion, Carbon trading, carbon credit; Carbon sequestration, Acid rain, Oil spills, Nuclear accidents National Environmental issues: Deforestation, forest fire, pollution(air, water, soil, noise, thermal, nuclear- brief account only) solid waste management- Plastic & e waste pollution, sewage, drinking water crisis Toxic products and disaster: Types of toxic substances – degradable, non degradable, Impact on human – case studies: Endosulphan tragedy, Bhopal disaster Flood, drought, cyclone, earthquake and landslide (Management and mitigation) Local Environmental issues: Landscape alteration, soil degradation, sand mining, quarrying,changing crop pattern, conversion of paddy lands Threats to water resources of Kerala: Degrading Mangrove and wetland ecosystems of Kerala, RAMSAR sites, Marine ecosystem crisis- pollution, overfishing Case study – Periyar river pollution. Water conservation- water recycling, rainwater harvesting, watershed management, Impact of tourism on	24-06-2019 25-06-2019 26-06-2019 27-06-2019 28-06-2019 29-06-2019 02-07-2019 03-07-2019 05-07-2019 08-07-2019 09-07-2019 10-07-2019 17-07-2019 18-07-2019 19-07-2019 22-07-2019	Lectures

Environment. Renewable Energy resources (solar, wind, hydroelectric, biomass and geothermal) and Non-renewable resources (mineral and metal ore, fossil fuels		
Introduction to Biodiversity: Types of biodiversity- Alpha, Beta and Gamma diversity. Concept and importance of Biodiversity: Levels of Biodiversity- Species diversity, Genetic diversity, Microbial, Ecosystem diversity, India as a mega-diversity nation, Biodiversity hotspots Reasons for Biodiversity depletion,– case study- two major biodiversity hotspots in India, Examples of habitat destruction/ fragmentation Protected area concept – Sanctuary, National Park, Biosphere reserve, Core Zone, Buffer Zone, Corridor concept. Conservation reserves. Concept of threatened fauna – IUCN categories - extinct, extinct in the wild, critically endangered, endangered, vulnerable, near threatened, least concern and data deficient. CITES. Red and Green Data Books. Man–animal conflict (Tiger, Elephant, Dog, Monkey) – causes and concern	24-07-2019 25-07-2019 26-07-2019 29-07-2019 30-07-2019 01-08-2019 02-08-2019 05-08-2019 06-08-2019 07-08-2019 16-08-2019 19-08-2019	Lectures Power point presentations
Environmental laws (Brief account only): The Water (Prevention and Control of Pollution) Act, 1974, The Air (Prevention and Control of Pollution) Act, 1981, Indian Forests Act (Revised) 1982. The Environment (Protection) Act, 1986, Hazardous Wastes (Management and Handling) Rules, 1989, The Forest (Conservation) Act, 1980, The Wildlife Protection Act, 1972, Biodiversity Act, 2002. Important global summits, Treaties and Protocols regarding Environmental issues, IPCC/UNFC, CBD, NBA, (Debate) Concept of Sustainable development, Environmental Auditing (Debate)	26-08-2019 27-08-2019 29-08-2019 30-08-2019 02-09-2019 03-09-2019 04-09-2019 05-09-2019 17-09-2019 18-09-2019 25-09-2019 26-09-2019	Lectures
Introduction, main concepts associated with Human Rights, Different types of human rights, Manifestations & phenomena, Role of agencies in promoting human rights, Mechanisms for checking violations of human rights, National human right commission, Constitutional provisions related to Human rights.	30-09-2019 01-10-2019 02-10-2019 03-10-2019 04-10-2019 05-10-2019	Lectures Power point presentations

V. Innovative Learning Programmes

VI. Assignments and Seminars

Assignments

The following Assignment needs to be submitted to Google Classroom. Both the assignments & presentation are individual assignments.

No	Topics	Activity	Submission Deadlines	
Assignment	Assignment on given topic	Preparation of assignment	Wednesday of 5th Week of Course	Submit the assignment to Google Classroom on or before 9pm
Seminar	PowerPoint presentation on given topic	PowerPoint Presentation for a presentation of 10 minutes duration	Wednesday of 8th Week of Course	Submit the assignment to Google Classroom on or before 9pm

Note: Failure to upload the assignment to Google Classroom *on the date mentioned will result in 0 marks for the assignment. Requests for extension of dates for submission not entertained.*

VII. Attendance (one component in class participation):

95-100%	5
90-95%	4
85-90%	3
80-85%	2
75-80%	1
<75	**Not eligible for appearing for ESE**

VIII. Required reading:

1. Erach Bharucha 2008 (UGC). Text Book of Environmental Studies of Undergraduate course.University Press.

2. J.B Sharma (2009), Environmental studies' - 3rdEd. University science Press

3. Misra S.P., Pandy S.N. 2009Essential Environmental Students, Ane books Pvt. Ltd.

4. P.D Sharma (2012), Ecology and Environment' - 11th Ed. Rastogi Publications

5. R.B Singh & Suresh Mishra PaulamiMaiti (1996), Biodiversity – Perception, Peril and Preservat ion'— PHI Learning , Environmental Law in India: Issues and Responses

6. Rajagopalan,R. 2005.*Environmental Studies from Crisis to Cure*. Oxford University Press, New Delhi.

7. Paul R.C., 2000.Situations of Human Rights in India. Efficient offset printers.

8. Arun kumar Palai(1999) National Human Rights Commission of India, Atlantic publishers

9. Sharma P.D. (2005) Environmental biology and Toxicology, Rastogi publication

10. Meera Asthana and Astana D.K.1990 Environmental pollution and Toxicology Alka printers.

11. Odum, E.P. 1971.Fundamentals of Ecology.W.B. Saunders College Publishing,Philadelphia

12. Alan Beeby, 2006 Anne – Maria Brennan First Ecology, Ecological principles and Environmental issues . International students edition Sec. edition Oxford University Press.

13. Robert Ricklefs (2001). The Ecology of Nature. Fifth Edition. W.H. Freeman and Company.

14. Stiling Peter (2002). Ecology: Theories and applications. Prentice Hall of India pvt.Ltd. New Delhi.

15. Landis, Wayne and Hing-hoYu, Baca Raton, 1995. Introduction to Environmental Toxicology: Impacts of chemicals upon Ecological systems: Lewis Publishers.

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ZOO5CRT0217- Cell Biology and Genetics

1. Course Instructor

Name	Programme, Semester and Batch	Email
Ms. Nimila P J	B.Sc. Zoology, Semester 5, 2019-20	nimilapj@alberts.edu.in

2. Duration of Course:

No.	Activity	Duration
1.	Contact Hours	50
2.	Assessment	4
	Total	54
	Remedial/ Peer Tutoring/ Tutorials (Need based and Optional)	2

3. About the Course:

The course introduces the molecular and structural organization of prokaryotic and eukaryotic cells, the Genetics section gives a detailed study of classical transmission of genetic information and provides an introduction to the principles of genetics.

By the end of this course students will be able to;

- Describe the fine structure of Prokaryotic and Eukaryotic cell.
- Demonstrate the process of cell division.
- Explain the process of communication between cells.
- Explain theories of classical genetics.
- Describe the mechanism of genetic variability.

Pre -requisites

- ✔ Knowledge of cell theory.
- ✔ Basic understanding of Mendel's theories and genetic crossing.

4. Course Delivery Plan

This course is a course requiring lot of student centric learning processes. The teaching methods include lectures, discussions, field-based assignments etc.

Topics	Date(s)	Methodology
History, Cell theory Prokaryotes and Eukaryotes Mycoplasmas, Virus, Virions and Viroid,	06-Jun-19 07-Jun-19	Lectures

Prions. Molecular models of cell membrane (Sandwich model, Unit membrane model, Fluid mosaic model). Cell properties - permeability, Transport [Diffusion, Osmosis, Passive transport, Active transport, bulk transport], Cell coat and Cell recognition.	10-Jun-19 12-Jun-19 13-Jun-19 14-Jun-19 17-Jun-19 19-Jun-19 20-Jun-19 21-Jun-19	
Structure and functions of following cell organelles: Endoplasmic reticulum Ribosomes (Prokaryotic and Eukaryotic). Golgi complex Lysosomes – Polymorphism. GERL concept. Mitochondria - Structure and functions. Nucleus: Structure and functions of interphase nucleus, nuclear membrane, pore complex, structure and functions of nucleolus. Chromosomes – Structure & organization, Heterochromatin, and Euchromatin, Nucleosomes. Polytene chromosomes- Balbiani rings, Endomitosis. Lamp brush chromosomes.	24-Jun-19 25-Jun-19 26-Jun-19 27-Jun-19 28-Jun-19 29-Jun-19 01-Jul-19 03-Jul-19 04-Jul-19 05-Jul-19 08-Jul-19 10-Jul-19	Lectures
Cell signalling - Types of signalling, signalling molecules (neurotransmitters, hormones, Growth Factors, Cytokines Vitamin A and D derivatives). Cell Division: Cell cycle - G1, S, G2 and M phases, Mitosis and Meiosis. The difference between Mitosis and Meiosis.	11-Jul-19 12-Jul-19 17-Jul-19 18-Jul-19 19-Jul-19 22-Jul-19 24-Jul-19 25-Jul-19 26-Jul-19 29-Jul-19 30-Jul-19	Lectures
Mendel's experiments- Monohybrid Cross, Dihybrid Cross, Mendel's Laws, Test Cross, Back Cross and Reciprocal Cross. Chromosome Theory of	01-Aug-19 02-Aug-19 05-Aug-19 07-Aug-19 08-Aug-19	GD, Lectures.

Inheritance. Interaction of genes: Allelic: Incomplete Dominance and Co-Dominance. Non-Allelic: Complementary (Flower colour in Sweet Pea) Supplementary (Coat colour in mice) Epistasis - dominant (Plumage in poultry) and recessive (Coat colour in mice). Polygenes (Skin colour inheritance in man) Pleiotropism. Lethal Alleles: Dominant lethal gene and recessive lethal gene. Multiple alleles – ABO Blood group system, Rh group and its inheritance. Erythroblastosis foetalis.	16-Aug-19 19-Aug-19 21-Aug-19 22-Aug-19 24-Aug-19 26-Aug-19 29-Aug-19	Class Works- Problem Solving.
Chromosome theory of sex determination- Autosome and Sex chromosomes, male heterogamy and female heterogamy- xx-xy, xx-xo, ZZ-ZW, ZZ-ZO. Genic Balance theory of Bridges. Barr bodies, Lyon's hypothesis. Gynandromorphism, sex mosaics, intersex (Drosophila). Hormonal and Environmental influence on Sex determination. Linkage and recombination of genes based on Morgan's work in Drosophila. Linked genes, Linkage groups, Chromosome theory of Linkage, Types of linkage- complete and incomplete. Recombination, cross over value, chromosome mapping. Sex Linked inheritance: Characteristics of Sex-Linked inheritance. X-linked inheritance of man.	30-Aug-19 02-Sep-19 04-Sep-19 05-Sep-19 06-Sep-19 16-Sep-19 18-Sep-19 19-Sep-19 20-Sep-19 23-Sep-19 25-Sep-19 26-Sep-19 27-Sep-19 28-Sep-19 30-Sep-19	Lectures

Y linked inheritance Incompletely Sex-Linked genes Sex limited genes Sex influenced genes		
Mutation: Chromosomal mutations - structural and numerical changes. Gene mutations - Addition, Deletion and substitution. Human Genetics: Karyotyping, Normal Human chromosome Complement. Pedigree analysis Aneuploidy and Non- disjunction. Autosomal abnormalities - Down syndrome, Cry du chat syndrome. Sex chromosomal abnormalities- Klinefelter's syndrome, Turner's syndrome. Single gene disorder - Autosomal single gene disorder -sickle cell anaemia Inborn errors of metabolism - phenylketonuria, alkaptonuria, Albinism. Multifactorial traits – polygenic disorder- cleft lip and cleft palate	02-Oct-19 03-Oct-19 04-Oct-19 05-Oct-19 09-Oct-19 10-Oct-19 11-Oct-19 14-Oct-19 16-Oct-19 17-Oct-19 18-Oct-19 23-Oct-19 24-Oct-19 25-Oct-19 28-Oct-19 30-Oct-19 31-Oct-19	Lectures, Co-operative Learning. Activity.

5. Innovative Learning Programmes

Name of Programme	Duration	Type	Proposed Time
Cooperative Learning.	2 days	Peer group Learning	7th Week
Pedigree chart	2 days	Activity	8th Week

6. Assignments and Seminars

Assignments

The following Assignment needs to be submitted to Google Classroom. Both the assignments & presentation are individual assignments.

No	Topics	Activity	Submission Deadlines
Assignment	Assignment on given topic	Preparation of assignment	Wednesday of 3rd Week of Course

Seminar	PowerPoint presentation on given topic	PowerPoint Presentation.	Wednesday of 10th Week of Course

Note: Requests for extension of dates for submission not entertained.

7. Attendance (one component in class participation):

95-100%	5
90-95%	4
85-90%	3
80-85%	2
75-80%	1
<75	**Not eligible for appearing for ESE**

8. Suggested Readings:

1. Zoological Society of Kerala Study material. 2002. *Cell Biology, Genetics and Biotechnology.*
2. Karp, G. (2010). *Cell and Molecular Biology: Concepts and Experiments.* VI Edition. John Wiley and Sons. Inc.
3. Koshy Thomas & Joe Prasad Mathew (Editors) (2011) *Cell Biology and Molecular Biology.*
4. Sarada K & Mathew Joseph (Editors) (1999) *Cell Biology, Genetics and Biotechnology.*
5. Thomas A.P (Editor) (2011) *Cell & Molecular Biology- The Fundamentals.* Green leaf publications. TIES. Kottayam.
6. Rastogi S. C. (1998) Cell Biology. Tata Mc. Graw Hill Publishing Co., New Delhi.
7. Powar C.B. (1983) Cell Biology (Himalaya Pub. Company).
8. Cooper, G.M. and Hausman, R.E. (2009). *The Cell: A Molecular Approach.* V Edition. ASM Press and Sunderland, Washington, D.C.; Sinauer Associates, MA.
9. De Robertis, E.D.P. and De Robertis, E.M.F. (2006). *Cell and Molecular Biology.* VIII Edition. Lippincott Williams and Wilkins, Philadelphia.
10. Shirly Annie Oommen, Sampath Kumar S., and Jinsu Varghese (Editors) (2012), Gene to Genome. Zoological Society of Kerala, Kottayam.

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St. Albert's College (Autonomous)

ZOO5CRT0317 EVOLUTION, ETHOLOGY & ZOOGEOGRAPHY

I. Course Instructor

Name	Sem, Programme & Batch	Email
Dr. Vincent Terrence Rebello	B.Sc. Zoology Semester 5 2019-20	terrence@alberts.edu.in

II. Duration of Course:

No	Activity	Duration
1	Contact hours	48 (Including assignments)
2	Assessment (CAE & ESE)	6
	Total	**54**
	Remedial Sessions/Peer Tutoring/Tutorials (need based & Optional)	4

III. Course Objectives:

- Acquire knowledge about the evolutionary history of earth - living and nonliving
- Understands the distribution of animals on earth, its pattern, evolution and causative factors.
- Basic knowledge on animal behavioural patterns and their role.
- Knowledge on principles of inheritance and variation.
- Knowledge on molecular basis of inheritance.
- Understanding on the mechanism and factors affecting evolution

IV. Course Delivery Plan

This course is essential in understanding the distribution of animals on earth, its pattern, evolution and causative factors and also in the shaping the basic knowledge on animal behavioural patterns and their role. The teaching methods will include lectures, power point presenations and cross over learning.

Topics	Session No & Date(s)	Methodology and Duration
Topics	Session No & Date(s)	Methodology and Duration
These are the topics to be covered in the modules		
EVOLUTION	06-06-2019	
Theories - Panspermia theory or Cosmozoic	07-06-2019	
theory, Theory of spontaneous generation	10-06-2019	Lectures
(Abiogenesis or Autogenesis), Special	13-06-2019	
creation, Biogenesis, Endosymbiosis.	14-06-2019	Power point presentations
Chemical evolution - Haldane and Oparin	18-06-2019	
theory, Miller-Urey experiment;	19-06-2019	
Direct evidences of evolution –	20-06-2019	Problem based learning

Recapitulation Theory of Haeckel, Fossilization, Kinds of fossils, fossil dating, Homologous organs and analogous organs. Theories of organic evolution Lamarckism and its Criticism, Weismann's Germplasm theory, Darwinism and its Criticism, Neo-Darwinism, Theory of De Vries, Population genetics and evolution: Hardy-Weinberg Equilibrium, gene pool, gene frequency. Factors that upset Hardy-Weinberg Equilibrium, Effects of genetic drift on population: Bottleneck effect and founder effect	21-06-2019 24-06-2019 25-06-2019 26-06-2019 28-06-2019 29-06-2019 19-07-2019	methods
Species and Speciation: Species concept, subdivisions of species (sub species, sibling species, cline and deme), Speciation: Types of speciation, Phyletic speciation (autogenous and allogenous transformations), True speciation, Instantaneous and gradual speciation, allopatric and sympatric speciation.	01-07-2019 02-07-2019 03-07-2019 05-07-2019 08-07-2019 09-07-2019 10-07-2019	Lectures Museum specimen study
Isolation: Types of isolating mechanisms-Geographic isolation (mention examples) and Reproductive isolation. Role of isolating mechanisms in evolution. Microevolution, Macroevolution (Adaptive radiation -Darwin finches) Mega evolution, Punctuated equilibrium, Geological time scale, and Mass extinction (brief account only). Evolution of Horse	11-07-2019 12-07-2019 16-07-2019 17-07-2019 18-07-2019 19-07-2019 23-07-2019	Lectures Power point presentations
ETHOLOGY Introduction : Definition, History and scope of ethology. Learning, imprinting and behaviour. Types of learning with examples; patterns of behaviors – types of rhythms, navigation, homing instinct, hibernation, aestivation; pheromones- types and their effect on behavior, hormones and their action on behavior (aggressive and parental behavior) Social organization.Social organization in insects (ants) and mammals (monkey), Courtship behaviour and reproductive strategies	24-07-2019 25-07-2019 26-07-2019 29-07-2019 01-08-2019 02-08-2019 05-08-2019 06-08-2019 08-08-2019 16-08-2019 19-08-2019 20-08-2019 21-08-2019 22-08-2019	Lectures
ZOOGEOGRAPHY Continental drift theory, Types and means of animal distribution, Factors affecting animal distribution; insular fauna – oceanic islands and continental islands, Zoogeographical realms Palaearctic region, Nearctic region, Neotropical region, Ethiopian region, Oriental region,	26-08-2019 27-08-2019 29-08-2019 30-08-2019 04-09-2019 05-09-2019 06-09-2019 16-09-2019	Lectures Power point presentations

Australian region (brief account with physical features and fauna, Wallace's line, Weber's line, Biogeography of India with special reference to Western Ghats.	18-09-2019 19-09-2019 20-09-2019

V. Innovative Learning Programmes

VI. Assignments and Seminars

Assignments

The following Assignment needs to be submitted to Google Classroom. Both the assignments & presentation are individual assignments.

No	Topics	Activity	Submission Deadlines	
Assignment	Assignment on given topic	Preparation of assignment	Wednesday of 5th Week of Course	Submit the assignment to Google Classroom on or before 9pm
Seminar	PowerPoint presentation on given topic	PowerPoint Presentation for a presentation of 10 minutes duration	Wednesday of 8th Week of Course	Submit the assignment to Google Classroom on or before 9pm

Note: Failure to upload the assignment to Google Classroom *on the date mentioned will result in 0 marks for the assignment. Requests for extension of dates for submission not entertained.*

VII. Attendance (one component in class participation):

95-100%	5
90-95%	4
85-90%	3
80-85%	2
75-80%	1
<75	**Not eligible for appearing for ESE**

VIII. Required reading:

1. Barton, N. H., Briggs, D. E. G., Eisen, J. A., Goldstein, D. B. and Patel, N. H. (2007).
2. Evolution.Cold Spring, Harbour Laboratory Press.
3. Barnes, C.W. (1988). Earth, Time and Life. John Wiley &Sons, NewYork
4. Bendall, D. S. (ed.) (1983). Evolution from Molecules to Man. Cambridge University
5. Press, U.K.
6. Bull J.J and Wichman H.A..(2001). Applied Evolution.Annu. Rev. Ecol. Syst. 32:183-217 Campbell, N. A. and Reece J. B. (2011). Biology. IX Edition, Pearson, Benjamin,
7. Cummings.
8. Chattopadhyay Sajib. (2002). Life Origin, Evolution and Adaptation.Books and Allied (P) Ltd. Kolkata, India.
9. Douglas, J. F (1997). Evolutionary Biology.Sinauer Associates.

10. Goodwin,B. (1996). How the Leopard Changed its Spots: The Evolution of Complexity.
11. Simon & Schuster, NY,USA.
12. Hall, B. K. and Hallgrimsson, B. (2008), Evolution. 4th Edition; Jones and Bartlett Publishers.
13. Coyne J.A. and Allen Orr H. (2004). Speciation, Sinauer Associates
14. Ridley, M. (2004), Evolution 3rd Edition. Blackwell Publishing
15. Rob Desalle and Ian Tattersall (2008). Human Origins: What Bones and Genomes Tell
16. Us about Ourselves. Texas A&M University Press, USA.
17. Strickberger, M.W.2000. Evolution. Jones and Bartlett, Boston
18. Agarwal. V. K. (2009). Animal Behaviour.S.Chand and Company Pvt. Ltd., New Delhi.
19. Bonner, J.T. (1980). The Evolution of Culture in Animals. Princeton University Press.NJ,USA.
20. David McFarland. (1999). Animal Behaviour. Pearson Education Ltd. Essex, England.
21. Dawkins, M.S. (1995).Unravelling Animal Behaviour. Harlow: Longman.
22. Dunbar, R. (1988). Primate Social Systems. Croom Helm, London.
23. Gundevia J.S. and Singh H.G. (1996), A Text Book of Animal Behaviour. S. Chand and Company Pvt. Ltd., New Delhi. Aubrey M. and Dawkins M.S. (1998). An Introduction to Animal Behaviour. Cambridge University Press,UK.
24. Briggs, J.C. (1996). Global Biogeography. Elsevier Publishers.(Module VI and VII).
25. Chandran Subash M.D. (1997). On the ecological history of the Western Ghats.Current Science, Vol.73, No.2.146-155.
26. Chundamannil Mammen.1993, History of Forest management in Kerala. Report No.89. Kerala Forest Research Institute, Peechi, India.
27. Daniels, R.J.R and Vencatesan J. (2008), Western Ghats Biodiversity. People Conservation; Rupa& Co. New Delhi. India.
28. Mani, M.S. (1974). Ecology and Biogeography of India; The Hague: .Dr. W. Junk b.v. Publishers,
29. Nair, C.S. (1991). The Southern Western Ghats: A Biodiversity Conservation Plan. INTACH, New Delhi.
30. Ramesh, B.R and R Gurukkal (2007), Forest Landscapes of the Southern Western Ghats, India- Biodiversity, Human Ecology and management Strategies. (French Institute of Pondicherry) India.
31. Tiwari, S. (1985), Readings in Indian Zoogeography (vol.1). Today & Tomorrow Printers & Publishers

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St. Albert's College (Autonomous)

Z0001-ZOO5CRT0-417 HUMAN PHYSIOLOGY, BIOCHEMISTRY, AND ENDOCRINOLOGY

I. Course Instructor

Name	Sem, Programme & Batch	Email
Prof. K. J. Benny	B.Sc. Zoology Semester V 2019-2020	bennykj@alberts.edu.in

II. Duration of Course:

No	Activity	Duration
1	Contact hours	50 (Including assignments)
2	Assessment (CAE & ESE)	4
	Total	54
	Remedial Sessions/Peer Tutoring/Tutorials (need based & Optional)	0

III. Course Objectives:

- This course will provide students with a deep knowledge in biochemistry, physiology and endocrinology.
- Defining and explaining the basic principles of biochemistry useful for biological studies for illustrating different kinds of food, their structure, function and metabolism.
- Explaining various aspects of physiological activities of animals with special reference to humans.
- Students will acquire a broad understanding of the hormonal regulation of physiological processes in invertebrates and vertebrates.
- By the end of the course, students should be familiar with hormonal regulation of physiological systems in several invertebrate and vertebrate systems.
- This also will provide a basic understanding of the experimental methods and designs that can be used for further study and research.
- The achievement of above objectives along with periodic class discussions of current events in science, will benefit students in their further studies in the biological/physiological sciences and health-related fields, and will contribute to the critical societal goal of a scientifically literate citizenry.

IV. Course Delivery Plan

This course is a course requiring lot of student centric learning processes. The teaching methods include lectures, discussions, field based assignments, Assignments/Seminars etc.

Topics	Session No & Date(s)	Methodology and Duration
HUMAN PHYSIOLOGY **Module I** **Nutrition: Nutritional requirements – carbohydrates, proteins, lipids, minerals (Ca, P, Fe, I), vitamins (sources and deficiency disorders). Importance of dietary fibre and antioxidants.Balanced diet, Recommended Dietary Allowance (RDA). Nutrition during pregnancy and lactation, Infant nutrition, Malnutrition(PEM).**	**06-Jun-19** **07-Jun-19** **10-Jun-19** **11-Jun-19**	
Digestion: Anatomy and histology of digestive glands (liver, pancreas, salivary, gastric and intestinal). Digestion and absorption of carbohydrates, proteins and fats.Nervous and hormonal control of digestion.	**17-Jun-19** **18-Jun-19** **19-Jun-19** **20-Jun-19**	**Lectures** **Lectures**
Module II **Respiration: Phases of respiration (external respiration, gas transport and internal respiration). Respiratory pigments: Haemoglobin, Myoglobin (Structure and Function). Transport of respiratory gases - transport of oxygen, oxyhaemoglobin curve, factors affecting oxyhaemoglobin curve, transport of carbon dioxide,(chloride shift). Control of respiration.Respiratory disturbances (Hypoxia, Hypercapnia, Asphyxia).Physiological effect of smoking, carbon monoxide poisoning, Oxygen therapy and artificial respiration.**	**21-Jun-19** **24-Jun-19** **25-Jun-19** **26-Jun-19** **27-Jun-19** **28-Jun-19** **29-Jun-19**	**Lectures**
Circulation: ESR, Haemopoiesis, blood pressure, ECG. Haemostasis (blood coagulation) – clotting factors, intrinsic and extrinsic pathways, anticoagulants and its mechanism of action.Cardiovascular diseases (Jaundice, Atherosclerosis, Myocardial infarction, Thrombus, Stroke).Angiogram and angioplasty.	**01-Jul-19** **02-Jul-19** **03-Jul-19** **04-Jul-19**	

Module III **Excretion: Histology of Bowman's capsule and tubular part. Urine formation – glomerular filtration, tubular reabsorption, tubular secretion. Urine concentration – counter current mechanism. Acid – base balance, hormonal regulation of kidney function. Renal disorders (kidney stone, acute and chronic renal failure, and dialysis). Homeostasis: Definition, concept and importance in biological system. Thermal regulation and thermal adaptation in homeotherms.** **Module IV** **Nerve physiology: Ultra structure of neuron. Nerve impulse production (resting membrane potential, action potential), transmission of impulse along the nerve fiber, interneuron (synaptic) transmission, neuromuscular junction and transmission of impulses.Neurotransmitters (acetyl choline, adrenalin, dopamine). EEG. Memory, Neural disorders (brief account on Dyslexia, Parkinson's disease, Alzheimer's disease, Epilepsy).** **Muscle physiology: Ultra structure of striated muscle, muscle proteins (myosin, actin, tropomyosin, troponin), Muscle contraction and relaxation-Sliding Filament Theory, cross bridge cycle, biochemical changes and ATP production in muscle, Cori cycle. Kymograph, Simple muscle twitch, muscle fatigue, tetanus, rigor mortis.**	**11-Jul-19** **12-Jul-19** **16-Jul-19** **17-Jul-19** **24-Jul-19** **25-Jul-19** **26-Jul-19** **29-Jul-19** **30-Jul-19** **01-Aug-19** **02-Aug-19** **05-Aug-19** **06-Aug-19**	**Lectures** **Lectures** **Lectures**
BIOCHEMISTRY **Module V** **Carbohydrates: Basic structure, biological importance and classification of monosaccharides, oligosaccharides, polysaccharides with examples.**	**02-Sep-19** **03-Sep-19**	**Lectures** **Lectures**

Proteins: Basic structure and classification of amino acids; structure, biological importance and classification of proteins with examples. **Lipids: Structure of fatty acid, saturated and unsaturated fatty acid, biological importance and classification of lipids with examples.** **Vitamins and minerals: Major fat soluble and water soluble vitamins. Important minerals and trace elements required for living organisms. Biological importance of vitamins and minerals.** **Enzymes: Chemical nature of enzymes, enzyme activation, enzyme inhibition, allosteric enzymes, isoenzymes, co-enzymes. Michaelis–Menten enzyme kinetics.** **Module VI** **Carbohydrate metabolism: Glycogenesis, Glycogenolysis, Gluconeogenesis, Hexose monophosphate Shunt, Glycolysis, Citric Acid Cycle, Electron Transport Chain and ATP synthesis. Ethanol metabolism.** **Protein metabolism: Deamination, Transamination, Transmethylation, Decarboxylation, Ornithine cycle.** **Lipid metabolism: Biosynthesis of fatty acids, Beta oxidation, physiologically important compounds synthesized from cholesterol.**	**20-Aug-19** **21-Aug-19** **22-Aug-19** **05-Sep-19** **06-Sep-19** **16-Sep-19** **17-Sep-19** **18-Sep-19** **19-Sep-19** **20-Sep-19** **23-Sep-19** **24-Sep-19**	**Lectures** **Lectures**
ENDOCRINOLOGY **Endocrinology and reproduction** **Module VII** **Endocrine physiology: Hormones – classification and mechanism of hormone action. Major endocrine glands(Histology is not included) their hormones, functions and disorders**	**17-Oct-19** **18-Oct-19** **23-Oct-19** **24-Oct-19** **25-Oct-19** **28-Oct-19** **29-Oct-19**	**Lectures**

(hypothalamus, pituitary gland, pineal gland, thyroid gland, parathyroid gland, islets of Langerhans, adrenal gland),. Homeostasis and feedback mechanism.	30-Oct-19	

V. Innovative Learning Programmes

Name of Programme	Duration	Type	Proposed Time

VI. Assignments and Seminars

The following Assignment needs to be submitted as individual assignments.

Number	Topics	Activity	Submission Deadline
Assignment	Assignment on given topic	Preparation of assignment	Thursday of 5th Week of Course

Note: Failure to submit the assignment on the date mentioned will result in 0 marks for the assignment. Requests for extension of dates for submission not entertained.

VII. Attendance (one component in class participation):

95-100%	5
90-95%	4
85-90%	3
80-85%	2
75-80%	1
<75	Not eligible for appearing for ESE

VIII. Required reading:

- Albert L. Lehninger, Michael Cox and David L. Nelson; 2004; Biochemistry Lehninger.
- Palgrave – Macmillan.
- Arthur C. Guyton and John E. Hall; 2016; Text Book of Medical Physiology: Guyton, 13th
- edition; Elsevier
- Barrington, E. J. W.; 1975; General and Comparative Endocrinology, Oxford, Clarendon
- Press.
- Bhagavan, N.V.. 2007. Medical biochemistry, fourth edition Academic Press,
- Awapara J, 1968. Introduction to Biological chemistry. Prentice Hall. New Jersey
- Geetha N. 2014. Textbook of Medical Physiology:. Paras Medical Publishers, 3rd edition
- Jain, A K.; 2016; Textbook of Physiology., Avichal Publishing Company
- Martin, C.R. 1985.Endocrine Physiology: Oxford University Press.
- Melmed, Shlomo, Williams, Robert Hardin; 2011; Textbook of Endocrinology: Elsevier,
- 12th edition
- Prosser and Brown,; 1962; Comparative Animal Physiology:, W. B. Saunders Co., West
- Washington Square, Philadelphia 5.
- Rastogi, S. C.; 2007; Outlines of Biochemistry . CBSPublishers, New Delhi.
- Robert K. Murray and Victor W. Rodwell; 2012; Harper's Illustrated Biochemistry, Harper;.
- 29th edition (Lange basic science.)
- Sarada Subramanyam and K. Madhavankutty; 2014; Textbook of human physiology.,
- S.Chand & Company Ltd,
- Satyanarayana U. and Chakrapani, U.; 2013. Biochemistry Elsevier; 4 edition

Dr. DEEPTHI AUGUSTINE
HEAD OF THE DEPARTMENT
P.G. DEPARTMENT OF ZOOLOGY
ST. ALBERT'S COLLEGE (AUTONOMOUS)
ERNAKULAM - 682018

St. Albert's College (Autonomous)

ZOO5COT0117- Public Health and [illegible]tion

1. Course Instructors

Name	Programme, Semester and Batch	Email
	B.Sc. Zoology, Semester 5, 2019-20	
Prof. K J Benny	Module I and II	kjbenny@alberts.edu.in
Dr. M L Joseph	Module V	mljoseph@alberts.edu.in
Dr. Vincent Terrence Rebello	Module III and IV	vincentterrence@alberts.edu.in
Ms. Nimila P J	Module VI	nimilapj@alberts.edu.in

2. Duration of Course:

No.	Activity	Duration
1.	Contact Hours	50
2.	Assessment	4
	Total	54
	Remedial/ Peer Tutoring/ Tutorials (Need based and Optional)	5

3. About the Course:

The course introduces the students to important topics in nutrition and public health. The course covers relevant topics like nutrition, nutritional defects and importance pf physical activity in day today life.

By the end of this course students will be able to;

- Describe the nutritional requirements.
- Explain the role of exercise in day today life.
- Differentiate different type of communicable diseases, its causes, modes of transmission and treatment/ preventive measures.

Pre -requisites

- ✓ Knowledge of nutrients.
- ✓ Basic understanding of biological terminologies.

4. Course Delivery Plan

This course is a course requiring lot of student centric learning processes. The teaching methods include lectures, discussions, field-based assignments etc.

Topics	Date(s)	Methodology
Dimensions and Determination of Health Physical Activity and Health benefits Effect of exercise on body systems – Circulatory, Respiratory, Endocrine, Skeletal and Muscular Programmes on Community health promotion (Individual, Family and Society) Dangers of alcoholic and drug abuse, medico-legal implications.	02-06-2016 06-06-2016 07-06-2016 08-06-2016 09-06-2016 13-06-2016 14-06-2016 15-06-2016 20-06-2016 21-06-2016	Lectures
Nutrition and Health 10 Hrs	22-06-2016 23-06-2016 16-06-2016 24-Jun-19	Lectures

Concept of Food and Nutrition, Balanced diet Vitamins, Malnutrition, Deficiency Disease Determining Caloric intake and expenditure Obesity, causes and preventing measures Role of Diet and Exercise, BMI	25-Jun-19 26-Jun-19 27-Jun-19 29-Jun-19 01-Jul-19 02-Jul-19	
Principles of Accident prevention Health and Safety in daily life. Health and Safety at work. First aid and emergency care. Common injuries and their management. Modern life style and hypokinetic diseases. Diabetes, Cardiovascular Disorders-Prevention and Management.	03-Jul-19 04-Jul-19 08-Jul-19 09-Jul-19 10-Jul-19 11-Jul-19 16-Jul-19 17-Jul-19 18-Jul-19	Lectures
Life skills, emotional adjustment and wellbeing. Yoga, Meditation and Relaxation, Psychoneuroimmunology.	22-Jul-19 23-Jul-19 24-Jul-19 25-Jul-19 29-Jul-19 30-Jul-19 01-Aug-19 05-Aug-19 06-Aug-19 07-Aug-19 08-Aug-19	GD, Lectures.
Public health and water quality. Potable water, Health and Water quality Faecal bacteria and pathogenic microorganisms transmitted by water. Determination of	19-Aug-19 20-Aug-19 21-Aug-19 22-Aug-19 24-Aug-19 26-Aug-19 27-Aug-19	

sanitary quality of drinking water, water purification techniques	29-Aug-19 02-Sep-19 03-Sep-19 04-Sep-19 05-Sep-19	Lectures
Water borne diseases-Cholera and Typhoid. Prevention of Water borne diseases. Food borne diseases and Prevention- Botulism, Salmonellosis, Hepatitis A Vector borne diseases and Control measures- Chikungunya, Filariasis and Dengue fever. Zoonotic disease- Leptospirosis & its control. Emerging diseases - Swine flu (H1N1), Bird flu (H5N1), SARS, Anthrax Re-emerging diseases –TB, Malaria	16-Sep-19 17-Sep-19 18-Sep-19 19-Sep-19 23-Sep-19 24-Sep-19 25-Sep-19 26-Sep-19 28-Sep-19 30-Sep-19 01-Oct-19 02-Oct-19 03-Oct-19 05-Oct-19 09-Oct-19 10-Oct-19	Lectures. Activity.

5. Innovative Learning Programmes

Name of Programme	Duration	Type	Proposed Time
Health Report Preparation	2 days	Activity	7th Week

6. Assignments and Seminars

Assignments

The following Assignment needs to be submitted to Google Classroom. Both the assignments & presentation are individual assignments.

No	Topics	Activity	Submission Deadlines
Assignment	Assignment on given topic	Preparation of assignment	Monday of 5th Week of Course

Seminar	PowerPoint presentation on given topic	PowerPoint Presentation.	Thursday of 10th Week of Course

Note: Requests for extension of dates for submission not entertained.

7. Attendance (one component in class participation)

Percentage	Marks
95-100%	5
90-95%	4
85-90%	3
80-85%	2
75-80%	1
<75	Not eligible for appearing for ESE

8. Suggested Readings:

1. Gladys Francis & Mini K.D., (Editors) (2012), Microbiology, Zoological Society of Kerala, Kottayam.

2. Greenberg, Jerol S and Dintiman George B (1997) Wellness Creating a life of Health and Fitness, London Allyn and Bacon Inc.

3. K Park, (2008) Park's Text Book of Preventive and Social Mediine 18th Edition. Banarasidass Bhenot Publication

4. Norman Bezzaant HELP First Aid for everyday emergencies. Jaico Publishing House, Bombay, Delhi.

5. Tom Sanders and Peter Emery. (2004) Molecular basis of human nutrition: Taylor & Francis Publishers Ane Book.

6. Pelczar M.J. Jr. E.C.S. Chane & N.R. Krieg, Microbiology (Concept & Applications). 5th edition. Tata McGraw Publishing Company Ltd.

Dr. DEEPTHI AUGUSTINE
HEAD OF THE DEPARTMENT
P.G. DEPARTMENT OF ZOOLOGY
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ERNAKULAM - 682018

St. Albert's College (Autonomous)

ZOO6CRT0217- MICROBIOLOGY AND IMMUNOLOGY

1. Course Instructors

Name	Programme, Semester and Batch	Email
Ms. Nimila P J	B.Sc. Zoology, Semester 5, 2019-20	nimilapj@alberts.edu.in

2. Duration of Course:

No.	Activity	Duration
1.	Contact Hours	50
2.	Assessment	4
	Total	54
	Remedial/ Peer Tutoring/ Tutorials (Need based and Optional)	5

3. About the Course:

The course will cover the history and developments in Microbiology. It overviews viral and bacterial structure, replications and pathogenesis. This course will introduce students to sterilization and disinfection techniques. The course comprehends the basic concepts of immune function and regulation.

By the end of this course students will be able to;

- Recognize the diversity of microbial world, compare their structure, reproduction and growth
- Acquire skills in aseptic techniques, culture and handling of microbes.
- Comprehend the methods for isolation of bacteria in pure cultures
- Assess the microbial load of bacteria from environmental samples.
- Describe about the key concepts of immune system, its role in human health and well-being.

Pre -requisites

- ✓ Knowledge of prokaryotic cell structure.
- ✓ Basic understanding of vertebrate circulatory system.

4. Course Delivery Plan

This course is a course requiring lot of student centric learning processes. The teaching methods include lectures, discussions, field-based assignments etc.

Topics	Date(s)	Methodology
Introduction: History and scope of Microbiology.	11-Nov-19 12-Nov-19	
Outline classification of Microbes.	13-Nov-19	Lectures

(Bacteria, fungi & viruses) Methods in Microbiology: Sterilization and Disinfection - Physical and Chemical methods. Culture media –Components of media, Synthetic media, Types-Solid, liquid, semisolid, basal, Selective media, Enrichment media, Differential media. Culture methods: Plating techniques and Isolation of pure colony (Streak, serial dilution & pour, spread) Culture preservation techniques: Refrigeration, deep freezing, freezing under liquid nitrogen, lyophilization.	14-Nov-19 18-Nov-19 19-Nov-19 20-Nov-19 21-Nov-19 25-Nov-19 26-Nov-19	
Morphology and fine structure of bacteria: Size, shape, cilia, pili, flagella, capsule, cell wall and its composition (Gram positive & negative). Cytoplasmic membrane, protoplast, spheroplast, intracellular membrane systems, cytoplasm, vacuoles, genetic material, cell inclusions, bacterial spores-types, formation. Staining techniques –Simple staining, Differential staining-Gram staining. Bacterial Reproduction: Asexual (Binary fission, budding, fragmentation), Bacterial growth Curve, Methods of Recombination (conjugation, transduction, transformation). Virology: Structure of viruses; Human, animal, and bacterial virus. Viral replication, -Lytic & lysogeny, cultivation of animal viruses.	27-Nov-19 28-Nov-19 29-Nov-19 02-Dec-19 03-Dec-19 04-Dec-19 05-Dec-19 06-Dec-19 09-Dec-19 10-Dec-19 11-Dec-19 12-Dec-19 13-Dec-19 16-Dec-19 17-Dec-19 18-Dec-19 19-Dec-19 20-Dec-19 31-Dec-19	Lectures

Infections & Diseases: Types of infections – primary, secondary and nosocomial infections. (Brief Account only) Contagious diseases – epidemic, endemic and pandemic, modes of Transmission – food, water, air, vectors and carriers. Diseases: Epidemiology, symptomology, diagnosis and treatment. Bacterial -Clostridium tetani(tetanus), Viral – HIV virus (AIDS), fungal –Candida albicans (candidiasis).	01-Jan-20 03-Jan-20 06-Jan-20 07-Jan-20 08-Jan-20 09-Jan-20 10-Jan-20 11-Jan-20	Lectures
Introduction: Immunity, types- Innate and acquired immunity, Passive (Natural and Artificial) and active immunity (Natural and Artificial). Mechanisms of innate immunity - Anatomic barriers, inflammation, phagocytosis. Overview of immune system: Lymphoid organs- Primary (Thymus, Bone marrow) and Secondary lymphoid organs (lymph nodes, spleen). Cells of the immune system- Lymphocytes: T and B cells, Natural killer cells, memory cells, macrophages.	01-Jan-20 03-Jan-20 06-Jan-20 07-Jan-20 08-Jan-20 09-Jan-20 10-Jan-20 11-Jan-20 22-Jan-20 23-Jan-20 24-Jan-20 25-Jan-20 27-Jan-20 29-Jan-20 22-Jan-20 23-Jan-20 24-Jan-20 25-Jan-20 27-Jan-20	Lectures.
Antigens- Basic properties, Types, haptens, adjuvants. Antibodies - immunoglobulin structure, classes and functions of immunoglobulins. Monoclonal & polyclonal antibodies. Antigen – Antibody reactions- Precipitation, immunodiffusion, Agglutination test, VDRL, WIDAL, ELISA. Types of Immune Response- Immune system in health and disease- Auto immune diseases:	28-Jan-20 29-Jan-20 30-Jan-20 31-Jan-20 03-Feb-20 04-Feb-20 05-Feb-20 06-Feb-20 07-Feb-20 10-Feb-20 11-Feb-20 12-Feb-20 13-Feb-20	Lectures

Pernicious Anemia, Rheumatoid Arthritis. Immunodeficiency disease - AIDS. Hyper sensitivity- Type I, (Eg. Anaphylaxis) Type II (Transfusion reaction), TypeIII (Arthus reaction) andType IV (Mantoux Test).		
Vaccines Introduction, Types of vaccines - Live attenuated, killed, toxoids, Current Vaccines, Recent trends in vaccine preparation	14-Feb-20 17-Feb-20 18-Feb-20 19-Feb-20 20-Feb-20 24-Feb-20 25-Feb-20 26-Feb-20 27-Feb-20 28-Feb-20	Lectures,

5. Innovative Learning Programmes

Name of Programme	Duration	Type	Proposed Time

6. Assignments and Seminars

Assignments

The following Assignment needs to be submitted to Google Classroom. Both the assignments & presentation are individual assignments.

No	Topics	Activity	Submission Deadlines
Assignment	Assignment on given topic	Preparation of assignment	Wednesday of 3th Week of Course
Seminar	PowerPoint presentation on given topic	PowerPoint Presentation.	Thursday of 5th Week of Course

Note: Requests for extension of dates for submission not entertained.

7. Attendance (one component in class participation):

Percentage	Marks
95-100%	5
90-95%	4
85-90%	3
80-85%	2
75-80%	1
<75	**Not eligible for appearing for ESE**

8. Suggested Readings:

1. Gladys Francis & Mini K.D., (Editors) (2012), Microbiology, Zoological Society of Kerala Kottayam.

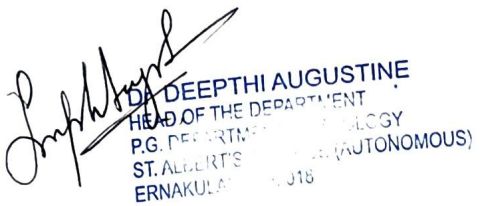
2. Kuby J, Kindt T., Goldsby R. and Osborne B. (2007). Kuby Immunology Sharma K. (2005) Manual of Microbiology: Tools and Techniques, Anes book

3. Susan Panicker & George Abraham (Editors) (2008), Micro Biology and Immunology, Zoological Society of Kerala, Kottayam.

4. Colemen: (2002). Fundamentals of Immunology.

5. Darla J. Wise & Gordon R. Carter: (2004): Immunology A Comprehensive ReviewIowa state University Press. A Blackwell science company,

6. Helen Hapel, Maused Harney Siraj Misbah and Next Snowden: (2006) Essentials of Clinical Immunology Fifth Ed. Blackwell Publishing Company Ltd.



St. Albert's College (Autonomous)

ZOO6CRT0317- Biotechnology, Bioinformatics and Molecular Biology

1. Course Instructors

Name	Programme, Semester and Batch	Email
Ms. Nimila P J	B.Sc. Zoology, Semester 6, 2019-20	nimilapj@alberts.edu.in

2. Duration of Course:

No.	Activity	Duration
1.	Contact Hours	50
2.	Assessment	4
	Total	54
	Remedial/ Peer Tutoring/ Tutorials (Need based and Optional)	2

3. About the Course:

The course introduces the students to basic terminologies and techniques in molecular biology and biotechnology. The course also offers introduction to bioinformatics tools.

By the end of this course students will be able to;

- Explain the nature of genetic material and gene concept
- Summarize gene expression and gene regulations
- Create an appreciation about the new developments in biotechnology
- Explain the role of bioinformatics in academic and research fields

Pre -requisites

- ✔ Understanding of genetic material.
- ✔ Idea about prokaryotic and eukaryotic cell structure.
- ✔ Basic knowledge of computer operations.

4. Course Delivery Plan

This course is a course requiring lot of student centric learning processes. The teaching methods include lectures, discussions and assignments / seminars.

Topics	Date(s)	Methodology
Nature of Genetic Materials: Discovery of DNA as genetic material – Griffith's transformation experiments. Avery Macarty and Macleod, Hershey Chase Experiment of Bacteriophage infection.	11-Nov-19	Lectures

Prokaryotic genome; Eukaryotic genome. Structure and. Types of DNA & RNA.DNA replication. Modern concept of gene (Cistron, muton, recon, viral genes)., Brief account of the following-- Split genes (introns and exons), Junk genes, Pseudogenes, Overlapping genes, Transposons.	13-Nov-19 14-Nov-19 15-Nov-19 18-Nov-19 20-Nov-19 21-Nov-19 22-Nov-19	
Gene Expressions: Central Dogma of molecular biology and central dogma reverse, one gene- one enzyme hypothesis, One gene-one polypeptide hypothesis Characteristics of genetic code, Contributions of Hargobind Khorana. Protein synthesis [prokaryotic]: Transcription of mRNA, Reverse transcription, post transcriptional modifications, Translation, Post translational modifications. Gene regulations: Prokaryotic (inducible & repressible systems) Operon concept -Lac operon and Tryptophan operon, Brief account of Eukaryotic gene regulation.	25-Nov-19 27-Nov-19 28-Nov-19 29-Nov-19 02-Dec-19 04-Dec-19 05-Dec-19 06-Dec-19 09-Dec-19 11-Dec-19 12-Dec-19 13-Dec-19 16-Dec-19 18-Dec-19 19-Dec-19	Lectures
Introduction: Scope, Brief History, Scope and Importance Tools and Techniques in Biotechnology: Enzymes (restriction endonucleases, ligases, linkers & adapters), Vectors-[Plasmids, Phage vectors, Cosmids, Artificial Chromosomes] Host cells. Basic steps & techniques in rDNA technology Gene Libraries, Construction of genomic library and cDNA Library. PCR technique and DNA amplification, Brief description of screening methods – Probes, Nucleic Acid hydridization, In situ Hybridization, Fluorescence in situ Hybridization (FISH), Colony hybridization. Methods of transfer of desired gene into target cell. Blotting Techniques- Southern, Northern, Western blotting. DNA Finger	20-Dec-19 01-Jan-20 03-Jan-20 06-Jan-20 08-Jan-20 09-Jan-20 10-Jan-20 11-Jan-20 13-Jan-20 15-Jan-20 16-Jan-20 17-Jan-20 20-Jan-20	Lectures

printing (DNA Profiling) and its application. Molecular markers - RFLP		
Animal Cell Culture: Brief account on methods, substrates, media and procedure of animal cell culture, Stem Cells, types and potential use, Organismal Cloning- reproductive & therapeutic- brief account only. Applications of Biotechnology: Applications in Medicine (insulin, growth hormone, gene therapy), Agriculture (GM plants and biopesticides), Environment (bioremediation), Industry (Single Cell Protein) and applications of Fermentation Technology- lactic acid, vitamins, food and beverages. Potential Hazards of Biotechnological Inventions: Risks related to genetically modified organisms (GMO) and biologically active products, biological warfare & Biopiracy. Protection of biotechnological inventions. Intellectual Property Rights, Patenting and patent protection.	22-Jan-20 23-Jan-20 24-Jan-20 25-Jan-20 27-Jan-20 29-Jan-20 30-Jan-20 31-Jan-20 03-Feb-20 05-Feb-20	Lectures.
Introduction: Definition, importance and role of bioinformatics in life sciences. Computational Biology. Biological databases: Nucleotide sequence databases (NCBI- GENBANK, DDBJ and EMBL). Protein databases - structure and sequence databases (PDB, SWISSPROT and UNIPROT). Introduction to Sequences alignments: Local alignment and Global alignment, Pair wise alignment (BLAST and FASTA] and multiple sequence alignment. Phylogenetic Tree construction and Analysis	06-Feb-20 07-Feb-20 10-Feb-20 12-Feb-20 13-Feb-20 14-Feb-20 17-Feb-20 19-Feb-20 20-Feb-20	Lectures
Molecular visualization software - RASMOL. Basic concepts of Drug discovery pipe line, computer aided drug discovery and its applications. Human Genome Project	24-Feb-20 26-Feb-20 27-Feb-20 28-Feb-20 02-Mar-20 04-Mar-20	Lectures.

5. Innovative Learning Programmes

Name of Programme	Duration	Type	Proposed Time

6. Assignments and Seminars

Assignments

The following Assignment needs to be submitted to Google Classroom. Both the assignments & presentation are individual assignments.

No	Topics	Activity	Submission Deadlines
Assignment	Assignment on given topic	Preparation of assignment	Monday of 2nd Week of Course
Seminar	PowerPoint presentation on given topic	PowerPoint Presentation.	Thursday of 4th Week of Course

Note: Requests for extension of dates for submission not entertained.

7. Attendance (one component in class participation):

Percentage	Marks
95-100%	5
90-95%	4
85-90%	3
80-85%	2
75-80%	1
<75	**Not eligible for appearing for ESE**

8. Suggested Readings:

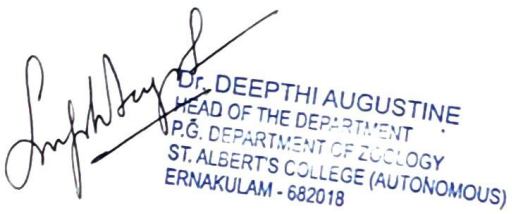
1. Singh B.D Biotechnology 2002. Kalyan Publishers New Delhi.
2. Brown C.H., Campbell I & Priest F, G. 1987. Introduction of Biotechnology Blackwell scientific publishers Oxford.
3. Colin Ratledge Bijorn Kristiansesn, 2008. Basic Biotechnology 3 rd ed. Cambridge University.
4. Janarathanan S & Vincent S. 2007. Practical Biotechnology, Method of Protocols. University Press.

5. John E. Smith. Biotechnology Cambridge Low priced ed. (Third Ed) 2005 Madingan, Martinko and Parker 2002, Biology of Microorganisms, Brock Eighth Ed. Prentice Hall.

6. Singh B.D. Biotechnolgy 2002, Kalyan Publishers New Delhi.

7. Sudha Gangal 2007. Biotechnology Principles and & practice of Animal Tissue culture, Universities Press.

8. Bruce Albert, Bray Dennis, Levis Julian, Raff Martin, Roberts Keith and Watson James 2008. Molecular Biology of the Cell, V Edition, Garland publishing Inc., New York and London.



St. Albert's College (Autonomous)

Z0001-Z006CRT0-417 OCCUPATIONAL ZOOLOGY
(APICULTURE, VERMICULTURE, QUAIL FARMING & AQUACULTURE)

I. Course Instructor

Name	Sem, Programme & Batch	Email
Dr. Vincent Terrence Rebello	B.Sc. Zoology Semester VI 2019-2020	vincentterrence@alberts.edu.in

II. Duration of Course:

No	Activity	Duration
1	Contact hours	50 (Including assignments)
2	Assessment (CAE & ESE)	4
	Total	54
	Remedial Sessions/Peer Tutoring/Tutorials (need based & Optional)	0

III. Course Objectives:

- To equip the students with self employment capabilities.
- To provide scientific knowledge of profitablefarming.
- To make the students aware of cottage industries.

Topics	Session No & Date(s)	Methodology and Duration
Module 1. APICULTURE Definition, Different species of honey bees, Organization of honey bee colony, Social life and adaptation of honey bees. Communication among honey bees. Bee keeping methods and equipments, Management and maintenance of an apiary, Growth period, honey flow period and dearth period Division of the colony, uniting two colonies, , replacing old queen with new queen, swarming management, monsoon management. Enemies of bees. Diseases of bees,.Bee pasturage. Uses of honey bees, By-products of honey bees, Honey and wax composition. Testing the quality of honey.Extraction of wax, Uses of honey and wax.Royal jelly, Propolis. Apitherapy, Agencies supporting apiculture.	13-Nov-19 14-Nov-19 15-Nov-19 20-Nov-19 21-Nov-19 22-Nov-19 27-Nov-19 28-Nov-19 29-Nov-19 04-Dec-19 05-Dec-19	Lectures, Activity
MODULE: 2. VERMICULTURE Introduction, Ecological classification of earth worms. Species of earth worms used for vermicultre, Reproduction & life cycle, Role of earth worm in solid waste management, in agriculture, in medicine etc. Preparation of vermibed, Maintenance & monitoring, Preparation of vermicompost, Preparation of vermiwash. Activity : Submission of a report after preparing a vermiculture unit or visiting a vermicomposting unit. MODULE: 3.QUAIL FARMING (Coturnix coturnix) Introduction, care of quail chicks, care of adult quails, care of breeding quails, ration for quail, care of hatching eggs, health care, use of quail egg and meat.Sources of quality chicks.	06-Dec-19 11-Dec-19 12-Dec-19 13-Dec-19 17-Dec-19 19-Dec-19 20-Dec-19 31-Dec-19 01-Jan-20 03-Jan-20 08-Jan-20 09-Jan-20 10-Jan-20 15-Jan-20 16-Jan-20 17-Jan-20 22-Jan-20	Lectures, Activity
MODULE: 4. AQUACULTURE. 24 Hrs Advantages and salient features of aquaculture, Types of Aquaculture, Biotic and abiotic	23-Jan-20 24-Jan-20 29-Jan-20	

V. Innovative Learning Programmes

Name of Programme	Duration	Type	Proposed Time

VI. Assignments and Seminars

The following Assignment needs to be submitted as individual assignments.

Number	Topics	Activity	Submission Deadline
Assignment	Assignment on given topic	Preparation of assignment	Thursday of 5th Week of Course

Note: Failure to submit the assignment on the date mentioned will result in 0 marks for the assignment. Requests for extension of dates for submission not entertained.

VII. Attendance (one component in class participation):

95-100%	5
90-95%	4
85-90%	3
80-85%	2
75-80%	1
<75	Not eligible for appearing for ESE

VIII. Required reading:

- NPCS Board, The complete book on Bee keeping and honey processing, NIIR Project
- consultancy services, 106E, Kamala nagar, Delhi- 110007.

- Shukla G.S, & Updhyay V.B, Economic zoology ,Rastogi Publ. Meerut.
- Pradip.V.Jabde , Text book of applied zoology, 2005
- Applied Zoology, Study Material Zoological Society of Kerala , CMS college Campus
- Clive. A Edwards, Norman. Q. & Rhonda. 2011. Vermitechnology: earthworms, organic
- waste & environmental management.
- Chauhan, H.V.S. Poultry, Disease, diagnosis and treatment, Wiley eastern Ltd Delhi.
- Otieno.F.O 2014. Quail farming: markets & market strategies
- Pillai T.V.R., Aquaculture, principles and practices.
- Ronald j. Roberts (1978) Fish pathology , Cassel Ltd London.
- Cowey C. B. *et. al.* (1985) Nutrition and feeding in fishes, academy press.
- Farm made aquafeeds. FAO fisheries Technical paper, 343.
- Harisankar J. Alappat& A. Bijukumar, Aquarium Fishes. B. R. Publ. Corporation, Delhi.
- MPEDA, A hand Book on AquafarmingOrnamentalfishes, MPEDA, Kochi.
- Amber Richards. 2014. Aquaponics at home.
- Pradip.V.Jabde. 1993. Text book of applied zoology
- Venkitaraman, P.R,1983, Text book of Economic zoology(SudharsanaPuubl. Kochi)
- Addison Webb, Bee Keepingfor profit and pleasure, Agrobios Ltd.
- Edwards.C.A.&Lafty, J.R.1972 Biology of earthworms(Chapman & Hall Led.London)
- Applied Zoology, Study Material Zoological Society of Kerala , CMS college Campus
- George cust& Peter Bird, Tropical Fresh water Aquaria, Hamlyn London.
- Verreth J. Fish larval nutrition, Chapman & Hall Publ.
- Bone Packer. 2014. Aquaponic system

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St. Albert's College (Autonomous)

ZOO6CBT0119 NUTRITION, HEALTH AND LIFESTYLE MANAGEMENT

I. Course Instructor

Name	Sem, Programme & Batch	Email
Dr. M. L. Joseph	B.Sc. Zoology Semester VI 2019-2020	mljoseph@alberts.edu.in
Dr. Vincent Terrence Rebello	B.Sc. Zoology Semester VI 2019-2020	vincentterrence@alberts.edu.in
Prof. K. J. Benny	B.Sc. Zoology Semester VI 2019-2020	bennykj@alberts.edu.in
Mrs. Nimila P. J.	B.Sc. Zoology Semester VI 2019-2020	nimilapj@alberts.edu.in

II. Duration of Course:

No	Activity	Duration
1	Contact hours	68 (Including assignments)
2	Assessment (CAE & ESE)	4
	Total	72
	Remedial Sessions/Peer Tutoring/Tutorials (need based & Optional)	0

III. Course Objectives:

- Provides students with a general concept of health and the parameters that define health and wellness.
- Understands principles of nutrition and its role in health.
- Knowledge regarding food safety, food laws & regulations.
- Knowledge and understanding regarding life style diseases.
- Promotes an understanding of the value of good life style practices, physical fitness and healthy food habits for life style disease management.

IV. Course Delivery Plan

This course is a course requiring lot of student centric learning processes. The teaching methods include lectures, discussions, Assignments/Seminars etc.

Topics	Session No & Date(s)	Methodology and Duration
Module I Nutrition and health: Nutritional requirements of man, classification of major nutrients including protein,vitamins and minerals, water, role of fibre, biological value of food components, food groups and sources, balanced diet, RDA, BMI, BMR, Calorie intake and expenditure, Healthy eating pyramid, Nutrition in infancy, preschool, school, adolescent, pregnancy, lactation and old age. Nutrition in diseases and special conditions. Food safety: Nutrition education, food sanitation and hygiene, food adulteration and consumer protection.	11-Nov-19 12-Nov-19 13-Nov-19 14-Nov-19 15-Nov-19 18-Nov-19 19-Nov-19 20-Nov-19 21-Nov-19 22-Nov-19 25-Nov-19 26-Nov-19 27-Nov-19 28-Nov-19 29-Nov-19	Lectures, GD
Module II Understanding of health: Define health, basic concepts, dimensions of health, basic parameters of health care. (Health Parameters: Individual normal standards, devices. 1. Blood pressure, 2. Brain activities and sleep, 3.Focus or attention, 4.Pulse, 5. Body temperature 6. Daily physical activities, 7. Electrocardiogram (ECG), 8.Cardiac fitness 9. Stress,10. Haematological parameters, 11. BMI Module III Introduction to Life style diseases Common life style diseases: Alzheimer's disease and other neural disorders, asthma, cancer, cardio vascular diseases - including hypertension, Atherosclerosis and stroke, chronic	02-Dec-19 03-Dec-19 04-Dec-19 05-Dec-19 06-Dec-19 09-Dec-19 10-Dec-19 11-Dec-19 12-Dec-19	Lectures

obstructive pulmonary disease, Diabetes Mellitus or Type 2 Diabetes, kidney disorders and chronic renal failure, constipation, depression, gastro-intestinal disturbances including diarrhoea and peptic ulcer, liver cirrhosis and other liver diseases, obesity, osteoporosis, occupational lifestyle diseases. Modern lifestyle disorders: sleeping habits, junk food, poor eating habits, anxiety, food poisoning	13-Dec-19 16-Dec-19 17-Dec-19 18-Dec-19 19-Dec-19 20-Dec-19 31-Dec-19 01-Jan-20 03-Jan-20 06-Jan-20 07-Jan-20 08-Jan-20 09-Jan-20 10-Jan-20 11-Jan-20 13-Jan-20 14-Jan-20 15-Jan-20 16-Jan-20 17-Jan-20 20-Jan-20 21-Jan-20	
Module IV 10 Hrs Causes of lifestyle diseases: Defects of modern food habits and unbalanced diet options, food adulteration, environmental pollution, poor life style choices, drug abuse, tobacco smoking, alcohol and drug consumption, lack of adequate exercise, wrong body posture, disturbed biological clock, stressful environmental conditions	22-Jan-20 23-Jan-20 24-Jan-20 25-Jan-20 27-Jan-20 28-Jan-20 29-Jan-20 30-Jan-20 31-Jan-20 03-Feb-20	Lectures, GD

	04-Feb-20 05-Feb-20 06-Feb-20 07-Feb-20 10-Feb-20 11-Feb-20 12-Feb-20 13-Feb-20 14-Feb-20 17-Feb-20	
Module V Prevention and control of life style diseases: Healthy life style habits and practices, healthy eating habits, exercise and fitness, good sleep patterns, a strict no to alcohol, drugs, and other illegal drugs. Uncontrollable factors like age, Module V Prevention and control of life style diseases: Healthy life style habits and practices, healthy eating habits, exercise and fitness, good sleep patterns, a strict no to alcohol, drugs, and other illegal drugs. Uncontrollable factors like age, gender, heredity and race. Healthy diet: disease prevention through appropriate diet and nutrition, avoiding foods that are high in fats, salt and refined products. Avoid junk food and replace by natural food/ organic food. Physical exercise: Moderate exercise for fitness of body, walking, stretching, right postures of sitting & standing, relaxation and cutting down of stress, sports, aerobic exercise and yoga. Health literacy as a public health goal: Awareness programs in schools, colleges	26-Feb-20 27-Feb-20 28-Feb-20 02-Mar-20 03-Mar-20 04-Mar-20	Lectures

and through mass media.		

V. Innovative Learning Programmes

Name of Programme	Duration	Type	Proposed Time

VI. Assignments and Seminars

The following Assignment needs to be submitted as individual assignments.

Number	Topics	Activity	Submission Deadline
Assignment	Assignment on given topic	Preparation of assignment	Thursday of 5th Week of Course

Note: Failure to submit the assignment on the date mentioned will result in 0 marks for the assignment. Requests for extension of dates for submission not entertained.

VII. Attendance (one component in class participation):

95-100%	**5**
90-95%	**4**
85-90%	**3**
80-85%	**2**
75-80%	**1**
<75	**Not eligible for appearing for ESE**

VIII. Required reading:

- AAPHERD (1980). Health Related Physical Fitness Test Manual. Published by
- Association drive Reston Virginia.
- ACSM (2005). Health Related Physical Fitness Assessment Manual Lippincott Williams
- and Wilkins USA, 3. Begum, M.R. (2006).A Text Book of Foods, Nutrition and Dietetics.
- 2nd Edn. Sterling Low Price Edition.Sterling Publishers Private Ltd., New Delhi.
- Bucher, C.A., (1979). Foundation of Physical Education (5th ed.). Missouri: C.V.Mosby
- co.
- Charles B.C.,et.al, C.A., (2004). Concepts of Fitness and Wellness. Boston: McGraw Hill.
- Delvin, T.M (1997). Text Book of Biochemistry with clinical correlation. 4th Edn. John
- Wiley and Sons Inc.Ltd.U.K.
- Evert, A.B. and Boucher J.L., (2014). New Diabetes Nutrition Therapy Recommendations:
- What You Need to KnowDiabetes Spectr. 2014 May; 27(2): 121– 130.Pubmed Published
- online 2014 May 14. doi: 10.2337/diaspect.27.2.121 8. Fahey,T.P. Insel,M, and W. Roth
- (2005) Fit and Well New York: McGraw Hill Inc.
- Greenberg, and Dintiman B 1997.Wellness Creating a life of Health and Fitness,London
- Allyn and Bacon Inc.
- Kumar, M and Kumar R. 2003 Guide to Healthy Living: Role of food and exercise. Deep
- and Deep Publications.
- Kumar, M. and Kumar R. 2004. Guide to Prevention of Lifestyle Diseases. Deep and
- Deep Publications.Curriculum for B.Sc. Zoology Programme.108
- Les Snowdan. ,(2002). Maggie Humphrey's Fitness walking, Maggie Humphery Orient
- Paper Backs 2002 New Delhi.
- Puri, K., and Chandra.S.S., (2005). Health and Physical Education. New Delhi: Surjeet
- Publications
- Rai, B.C., (2005). Health Education and Hygiene Published by Prakashan Kendra,
- Lucknow.
- Ralph, S., Barger P., Jr. and Leolson E. (1999) Life Fit, 1999 Human Kinetics USA
- Schlenker, E. and J.A.Gilbert. (2014) Essentials of Nutrition and Diet Therapy, Edt.
- RDWilliams. 11e Paperback – Import, 4 Nov 2014
- Sing.MD. (2008). Textbook of Nutritional Health and First Ed:2008 Academic
- excellence.

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