St. Albert's College (Autonomous)

Z0001-ZOO1CRT0-1 GENERAL METHODOLOGY AND PERSPECTIVES IN SCIENCE

I. Course Instructor

Name	Sem, Programme & Batch	Email
Prof. K. J. Benny	B.Sc. Zoology Semester I 2016-17	bennykj@alberts.edu.in
Mrs. Nimila P. J.	B.Sc. Zoology Semester I 2016-2017	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:

- To make aware of the basic philosophy of science, its history, concepts and scope
- To develop proper scientific mind, culture and work habits
- To familiarize with the basic tools and techniques of scientific study with emphasis on biological sciences

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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.** **Types of knowledge: practical, theoretical, and scientific knowledge. Information. What is science; what is not science; laws of science.**	**02-06-2016** **09-06-2016**	**Lectures**
Basis for scientific laws and factual truths.**Science as a hu** **empiricism. Vocabulary of science, science disciplines. Revolutions in Science and Technology** **Module II** **Life and its manifestations.** **History of Biology, Biology in ancient times, Landmarks in the progress of Biology, Branches of Biology**	**16-06-2016** **23-06-2016** **07-07-2016**	**Lectures**
Module III: Tools and Techniques in Biology **Scientific Drawing – Purpose and Principle** **Basic understanding on principle and uses of the following:** **Microscopy (a) Light microscopy, Bright field (Compound Microscope), Phase contrast, Dark field microscopy, Fluorescence, Polorization microscopy, Vide microscopy. (b) Electron - Scanning (SEM), Transmission (TEM) and STEM, Micrometry – Stage and Eyepiece micrometers, Camera Lucida, Instrumentation, pH Meter,** **Separation Techniques, Centrifuge, Chromatography,**	**14-07-2016** **21-07-2016** **28-07-2016** **04-08-2016** **11-08-2016**	**Class Activity, Lectures**

Electrophoresis, Analytical Techniques – Colorimeter, Spectrophotometer, X-ray Crystallography		
Module IV. Animal Collection techniques Collection Methods, Techniques and Equipments – Plankton, Insects, Fish, Bird. Preservation Techniques – Taxidermy, Rearing Techniques – Laboratory and field Module V: Introduction, Animal Rights and Animal Laws in India, Prevention of cruelty to animals Act 1960, Wild life Protection Act 1972 and Amentments, Biodiversity Act 2003, Concept of 3 R Conservation (Refined to minimize suffering, Reduced – to minimize animals, Replaced – modern tools and alternate means. Animal use in research and education, Laboratory animal use, care and welfare, Animal protection inititiatives, Animal Welfare, Animal welfare Board, India CPCSEA, Working with humans, harm, risks and benefits, Consent. Special cases - Children and vulnerable people, Equality, Anonymity, Confidentiality, Information storage and dissemination, Human Rights Act 1995, 1998, Right to information 2005. Module VI: Research Methodology Scientific method – steps and process, Types, Research communication, Research report writing (Structure of a scientific paper), Presentation techniques, Project proposal writing, Assignment, Seminar, Debate, Workshop, Colloquium, Conference - Brief description and major differences. Module VII: Units of measurements Calculations and related conversions of each: Metric system – length, surface, weight, Square measure – Cubic measures (volumetric) Circular or angular measure, Concentrations – percent volume, ppt, ppm, Chemical – molarity, normality, Temperature – Celcius, Centigrade, Fahrenheit	01-09-2016 29-09-2016 06-10-2016 13-10-2016 27-10-2016 03-11-2016	Lectures

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):

% of Attendance	Grade
Above 90%	A
Between 85 and 90	B
Between 80 and 85	C
Between 75 and 80	D
Below 75	E

VIII. Required reading:

- Aggarwal. S.K. 2009 Foundation Course in Biology, 2nd Ed.. Ane's Student Edition. Ane Books Pvt. Ltd.
- Anderson, J, Durston, B.H. and Poole, M. 1992. Thesis and assignment writing. Wiley Eastern Ltd.
- Bowler Peter J., and Iwan Rhys Morus. 2005 *Making Modern Science: A Historical Survey*. University of Chicago Press, Chicago, IL:
- Day, R.A. 1993. How to write and publish a scientific paper. Cambridge University Press. (Module VI)
- Day, R.A. 2000. Scientific English: A guide for Scientists and other

Professionals.

- Universities Press. (Module VI)
- Debbies Holmes, Peter Moody and Diana Dine 2006 Research methods for the Biosciences. International student Edition : Oxford University Press .
- Eldon D. Enger ,Frederick C. Ross and David Bailey 2008 (Eleventh Edition) *Concepts in Biology* .Tata-McGraw Hill , New Delhi.(Module VII, II & III)
- Ernst Mayr 1982. *The Growth of Biological Thought: Diversity, Evolution, and Inheritance*. Published by Harvard University Press.
- Ernst Myer .1997. *This is Biology: The Science of the Living World.* Universities Press, Hyderabad, India
- Ervin Schrodinger 1944. What is life? Mind and Matter. Cambridge University Press Gupta K.C, Bhamrah, H.S and G.S.Sandhu 2006.Research Techniques in Biological
- Sciences. Dominant Publishers and Distributors, New Delhi.
- Hawkins C. and Sorgi, M. 1987. Research: How to plan, speak and write about it. Narosa Publishing House.
- Jacques Monod 1971. *Chance and Necessity: An Essay on the Natural Philosophy of Modern Biology.* Vintage Pub. NY
- Kuhn, Thomas. 1996 *The Structure of Scientific Revolutions*. 3rd ed.: University of Chicago Press, Chicago, ILMarie, M. 2005. Animal Bioethics: Principles and Teaching Methods Wageningen Academic Publishers
- Michael Roberts,Tim King and Michael Reiss.1994.Practical Biology for Advance Level.
- Thomas Nelson and Sons Ltd. Surrey, UK.
- Ruxton, G.D. and Colegrave, N. 2006. Experinmental design for the life sciences.
- Oxford University Press.
- Sateesh, M.K. 2008 Bioethics and Biosafety; I.K. International Publishing House (Module V)
- Taylor D.J. Green N.P.O, Stout G.W. Editor R. S. Oper, 2008 Biological science (Third edition Cambridge University press

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St. Albert's College (Autonomous)

Z0001-ZOO2CRT0-1 BIODIVERSITY AND MODERN SYSTEMATICS

I. Course Instructor

Name	Sem, Programme & Batch	Email
Prof. K. J. Benny	B.Sc. Zoology Semester II 2016-17	bennykj@alberts.edu.in
Mrs. Nimila P. J.	B.Sc. Zoology Semester II 2016-2017	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:

- To create appreciation on diversity of life on earth
- To understand different levels of biological diversity
- To familiarize taxa level identification of animals
- To learn biodiversity estimation techniques
- To create interest for conservation of biodiversity

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 **PART I: BIODIVERSITY** **Module I – Introduction to Biodiversity, Definition, Historical perspective Concepts - Nature – environment – biodiversity, Scope and importance** **Module II – Levels of biodiversity** **Genetic, Species, Ecosystem, Domesticated, Microbial diversity, Distribution of biodiversity on earth, Tropical, temperate and polar, Landscapes and interactions, Biodiversity hotspots** **Module III – Values of biodiversity, Direct use value, Indirect use value, Non use value, Ecosystem services** **Module IV – Threats to biodiversity** Types of threats - Habitat loss, man- wildlife conflict (with case studies), Invasive species, Pollution, Over exploitation and human population, Climate change Module V – Biodiversity conservation and management **Conservation strategies - *In situ, ex situ,* National parks, Sanctuaries and Biosphere reserves** **International efforts - Convention on Biological Diversity (CBD), IUCN- WCMC, UNEP** Legal measures - Wild life Protection Act, 1972 The Environment Protection Act, 1986 Forest (Conservation) Act1980, 1988 Biodiversity Act 2002, Biodiversity rule 2004 National biodiversity action plan, People's participation – Peoples biodiversity register (PBR), Local initiatives	**17-11-2016** **24-11-2016** **01-12-2016** **08-12-2016** **15-12-2016** **22-12-2016** **05-01-2017** **12-01-2017** **19-01-2017** **02-02-2017** **09-02-2017**	**Lectures** **Lectures**

Module VI – Biodiversity estimation – tools and techniques, Sampling techniques – Quadrate, Line transect, Measurements – Density, Abundance, Frequency, Biodiversity indices – concepts - Shannon-Weiner, Simpson **PART II – MODERN TAXONOMY** **Module VII – Taxonomical Principles, Brief history Concepts and definition, Approaches of taxonomy, Molecular taxonomy, Importance of classification, Phylogeny and Taxonomy– Tree of Life, bar coding of life, Zoological nomenclature, International Code of Zoological Nomenclature (ICZN)**	**16-02-2017** **23-02-2017** **02-03-2017**	**Lectures**
Module VIII – Tools and techniques Identification Keys - Dichotomous keys (Single access key), Polytomous key, Multi access key, Advantages and disadvantages	**09-03-2017** **16-03-2017**	**Lectures**

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):

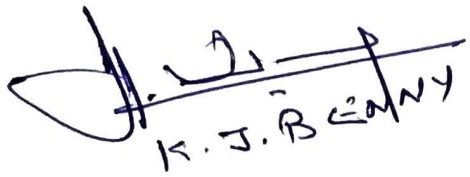
% of Attendance	Grade
Above 90%	A
Between 85 and 90	B
Between 80 and 85	C
Between 75 and 80	D
Below 75	E

VIII. Required reading:

- Andrew S. Pullin 2002. *Conservation Biology*. Cambridge University Press, Cambridge, UK.
- Anne E. Magurran 2004. *Measuring Biological Diversity* .Blackwell Publishing, MA, USA.
- Chapman J.L. & M.J. Reiss 2006 Ecology, Principles and Applications. Sec Edition Cambridge University Press.
- Daily,G.C. (Ed.), 1997.*Nature's Services : Societal Dependence on Natural Ecosystems*.
- Island Press, Washington D C.
- Forman, R.T and M. Gordaon. 1986. *Landscape Ecology*. John Wiley &Sons, NY, USA. Kapoor ,V.C.1998. Theory and Practice of Animal Taxonomy. Oxford and IBH Pub.Co,
- New Delhi
- Karunakaran, C.K. 2003. Politics of vanishing forests in Kerala. Kerala Sastra Sahitya Parishat, Thiruvananthapuram.
- Land resource based perspective plan for 2020 AD. Kerala State Land Use Board, Thiruvananthapuram
- Myers, Norman.1984. *The Primary Source: Tropical Forests and Our Future*. W.W. Nortan & Company, NY.
- Myers,N., Mittermiere,R.A., Mittermeier,C.G., Dea Fonseca,G.A.B and J.Kent. 2000.
- Biodiversity hotspots for conservation priorities. *Nature*, 403:853-858.
- Nair, K.N.S and Parameswaran,P.1976. *Keralathinte Sampath (Wealth of Kerala).*
- Kerala Sastra Sahithya Parishad, Trivandrum, Kerala.
- Nair, M.P., Pushpangathan, P., Rajasekharan, S.,Narayanan Nair.K. and Dan Mathew. "*Jaivavaividhyam*" (Biodiversity). State Institute of Languages, Thiruvananthapuram
- State of the Environment Report, Kerala. (Annual Publication), Kerala State Council for Science, Technology and Environment,

Thiruvananthapuram

- **Supriyo Chakraborty.2004 *Biodiversity*. Pointer Publishers, Jaipur, India.**
- **Thomas A.P.,(Editor) 2009 Biodiversity scope & challenges. Green Leaf publications Kottayam**
- **Wilson E.O., 1988 (Editor).*Biodiversity*. National Academy press, Washington DC, USA.**



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St. Albert's College (Autonomous)

Z0001-ZOO3CRT0-1 ANIMAL DIVERSITY- NON CHORDATA

I. Course Instructor

Name	Sem, Programme & Batch	Email
Dr. M. L. Joseph	B.Sc. Zoology Semester III 2016-17	mljoseph@alberts.edu.in
Dr. Vincent Terrence Rebello	B.Sc. Zoology Semester III 2016-2017	vincentterrence@alberts.edu.in
Prof. K. J. Benny	B.Sc. Zoology Semester III 2016-2017	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:

- To study the scientific classification of invertebrate fauna.
- To learn the physiological and anatomical peculiarities of some invertebrate phyla through type study.
- To learn the evolutionary significance of various invertebrate fauna
- To stimulate the curiosity in living things around them.

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
These are the topics to be covered in the modules **MODULE I** **Introduction: Briefly mention the following** **Classification – Keys and Principles** **Nomenclature (Uninominal, Binomial, & Trinomial), Law of Priority.**	01-06-2016 02-06-2016 03-06-2016	Lectures
Two kingdom and Five kingdom classification.	06-06-2016	
Symmetry - Asymmetry, Spherical, Radial, Biradial and Bilateral	07-06-2016	
Coelom – Acoelomates, Pseudocoelomates and Eucoelomates	08-06-2016	
Schizocoelom, Enterocoelom., Protostomia and Deuterostomia	09-06-2016 13-06-2016	
Kingdom Protista Type: Paramecium	14-06-2016	
Salient features and classification up to phyla	15-06-2016 16-06-2016	
. Phylum Rhizopoda	17-06-2016 20-06-2016	
2. Phylum Actinopoda	21-06-2016 22-06-2016	
3. Phylum Dinoflagellata	23-06-2016 24-06-2016	
4. Phylum Parabasalia	27-06-2016	
5. Phylum Metamonada	28-06-2016 29-06-2016 30-06-2016	Lectures
6. Phylum Kinetoplasta	01-07-2016 04-07-2016	
7. Phylum Euglenophyta	05-07-2016 07-07-2016	
8. Phylum Cryptophyta	08-07-2016 11-07-2016 12-07-2016	

9. Phylum Opalinata **10. Phylum Bacillariophyta :Diatoms** **11. Phylum Chlorophyta :Volvox** **12. Phylum Choanoflagellata : Proterospongia** **13. Phylum Ciliophora : Paramecium** **14. Phylum Sporozoa : Plasmodium** **15. Phylum Microsporidia :Nosema** **16. Phylum Rhodophyta :Red Alga** **(Mention any five general characters for each phylum. Detailed accounts of examples are not necessary.)** **General Topics : (1)Parasitic Protozoans (2). Life cycle of Plasmodium Kingdom Animalia Outline classification of Kingdom Animalia.** Three branches - Mesozoa, parazoa, Eumetazoa. MODULE II **Mesozoa - Eg. Rhopalura.** **Phylum Porifera. (3 hrs)** Classification upto classes. **Class I- Calcarea. Eg. Sycon., Class II – Hexactinellida . Eg. Euplectella. Class III – Demospongia Eg. Cliona.** **General Topics** **1. Reproduction in sponges 2. Canal system in sponges.** **Phylum Coelenterata Type: Obelia (6hrs)** **Classification upto classes.** **Class I - Hydrozoa Eg. Halistemma. Class II – Scyphozoa Eg. Rhizostoma. Class III- Anthozoa Eg. Fungia.** **General Topics: Coral and coral reefs with special reference to conservation of reef fauna.** **2. Polymorphism in Coelenterates** **MODULE III**	20-07-2016 21-07-2016 22-07-2016 25-07-2016 26-07-2016 27-07-2016 28-07-2016 08-08-2016 09-08-2016 10-08-2016 11-08-2016 12-08-2016 22-08-2016 23-08-2016	GD, Lectures

Phylum Ctenophora. (1 hr) Eg. Pleurobrachia. Phylum Platyhelminthes (3hrs) Classification upto classes. Class I - Turbellaria. Eg. Planaria. Class II – Trematoda Eg. Fasciola Class III- Cestoda Eg. Taenia saginata. General Topics- 1.Life history of Fasciola hepatica. 2.Platyhelminth parasites of Man and Dog (Schistosoma, Taenia solium, Echinococcus). Phylum Nematoda Class phasmidia Eg. Enterobius, Ascaris Class Aphasmidia Eg. Trichinella General Topic- Pathogenic nematodes. (Wuchereria bancrofti, Ancylostoma duodenale, Trichinella). Phylum Annelida Classification upto classes. Class I-Archiannelida Eg. Polygordius Class II – Polychaeta Eg. Chaetopterus ClassIII- Oligochaeta Eg. Megascolex. Class IV - Hirudinomorpha Eg. Ozobranchus,Hirudinaria		Lectures
MODULE IV Phylum- Onychophora Eg. Peripatus (Mention its affinities). Phylum Arthropoda Type: Panaeus Classification upto classes. Divided into 3 subphyla. 1. Sub Phylum - Trilobitomorpha Class - Trilobita (mention salient features).	31-08-2016 01-09-2016 02-09-2016 05-09-2016	Lectures

2. Sub Phylum- Mandibulata **Class I – Crustacea Eg. Sacculina** **Class II- Chilopoda Eg. Centipede (Scolopendra) Class III – Symphyla Eg. Scutigerella** **Class IV – Diplopoda Eg. Millipede (Spirostreptus)** **Class V - Insecta Eg. Dragon fly** **Class VI – Pauropoda Eg. Pauropus** **3. Sub Phylum - Chelicerata** **Class - Merostomata Eg. Limulus Class II – Arachnida Eg. Scorpion** **General Topics** **1. Vectorial Arthropods** **2. Larval forms of Penaeus**	**17-10-2016** **18-10-2016** **19-10-2016** **20-10-2016**	**Lectures**
MODULE V **Phylum Mollusca** Classification upto classes Class I- Monoplacophora Eg. Neopilina Class II- Amphineura Eg. Chiton Class III- Gastropoda Eg. Aplysia Class IV- Scaphopoda Eg. Dentalium Class V- Pelecypoda Eg. Pinctada Class VI- Cephalopoda Eg. Sepia General Topic- Pearl formation and culture	**28-10-2016** **31-10-2016** **01-11-2016** **02-11-2016**	**Lectures**
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.		**Lectures**

2 Larval forms of Echinoderms **Minor Phyla** 1 Chaetognaths Eg. Sagitta 2 Sipunculida Eg. Sipunculus 3 Rotifera Eg. Brachionus **Phylum Hemichordata** Eg. Balanoglossus		

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):

% of Attendance	Grade
Above 90%	A
Between 85 and 90	B
Between 80 and 85	C
Between 75 and 80	D
Below 75	E

VIII. Required reading:

- **Anderson D.T. 2001Invertebrate Zoology Sec Edition Oxford University Press Barnes R.D. 1987. Invertebrate Zoology. W. B. Saunders. New York.**
- **Dhami.P.S. and Dhami J.K. 1979 Invertebrate Zoology. R. Chand and Co. New Delhi.**

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These are the topics to be covered in the modules **MODULE I** **Introduction** **Phylum Chordata - General classification** (Classification up to order – Sub phylum, Super class, Class, Subclass, Order) 1. Sub phylum : Urochordata	14/11/2016 16/11/2016 18/11/2016 21/11/2016 23/11/2016 25/11/2016 28/11/2016 30/11/2016 02/12/2016 05/12/2016	**Lectures**
Class I Larvacea Eg. Oikopleura	07/12/2016	
Class II Ascidiacea Eg: *Ascidia* (Mention Retrogressive Metamorphosis) **Class III Thaliacea Eg: *Doliolum*** 2. Sub phylum: Cephalochordata **Example - *Amphioxus***	09/12/2016 14/12/2016 16/12/2016	**Lectures**
MODULE II 3. Sub phylum:Vertebrata 4. Division 1 – Agnatha	19/12/2016 21/12/2016	**Lectures**
Class I Ostracodermi Eg: *Cephalaspis* **Class II Cyclostomata Eg: *Petromyzon*** **Division 2 – Gnathostomata** **Super class Pisces** **Class: Chondrichthyes** Sub class - Elasmobranchi Eg: Narcine Sub class Holocephali Eg: *Chimaera* Class: Osteichthyes Sub class – Choanichthyes Order 1 Crossopterigii Eg: *Latimeria* Order 2 DipnoiEg: *Lepidosiren* Sub class: - Actinopterygii Super order 1. Chondrostei Eg: *Acipencer*	23/12/2016 02/1/2017 04/1/2017 06/1/2017 09/1/2017 11/1/2017 13/1/2017 16/1/2017 18/1/2017 20/1/2017 23/1/2017 25/1/2017 27/1/2017 30/1/2017 01/2/2017 03/2/2017 06/2/2017 08/2/2017 10/2/2017	**Lectures**

Super order 2. Holostei Eg: *Amia* Super order 3. Teleostei Eg: *Sardine* General topics Accessory respiratory organs in fish **Parental care in fishes.** **Scales in fishes.** **Migration in fishes** **Common culture fishes of Kerala** **Lung fishes** **MODULE III** **Super class: Tetrapoda** Class Amphibia Type Frog, Order I Anura Eg: *Hyla* Order II Urodela Eg: *Amblystoma* (Mention axolotl larva and 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* Sub class IV: Synapsida Eg: *Cynognathus* General topic Identification of poisonous and non poisonous snakes Class Aves **Sub class I: Archeornithes Eg: Archaeopteryx (Affinities)** **Sub class II: Neornithes**	13/2/2017 15/2/2017 17/2/2017 20/2/2017 22/2/2017 27/2/2017 01/3/2017 03/3/2017 06/3/2017 08/3/2017 10/3/2017 13/3/2017 15/3/2017 17/3/2017 20/3/2017	

Super order I: Palaeognathe Eg: *Struthio* Super order II: Neognathe Eg; Brahminy kite General topics Migrations in birds Flight adaptations in birds MODULE IV Class Mammalia Type: Rabbit Sub class I: Prototheria Sub class II: Metatheria Order 1. Insectivora Order 2 Dermoptera Order 3. Chiroptera Order 4. Primates Order 5 Carnivora Order 6 Edentata Order 7 Pholibota Order 8 Proboscidea Order 9 Hydracoidea Order 10 Sirenia Order 13 Lagomorpha Order 14 Rodentia General 1. Dentition in Mammals 2. Aquatic Mammals		

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):

% of Attendance	Grade
Above 90%	A
Between 85 and 90	B
Between 80 and 85	C
Between 75 and 80	D
Below 75	E

VIII. 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. Kotpal R.L. 2000, Modern Text Book of zoology, Vertebrates, Rastogi Publications,
- Meerut.
- Nigam and Sobti 2000, Functional Organization of Chordates. Shoban Lal Nagin Chand and Co. New Delhi.
- Young J.Z, 1981, The Life of Vertebrates Oxford University Press.
- Young J.Z. 2006 The life of Vertebrates Oxford University Press (Third Ed.) India Ed.

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St. Albert's College (Autonomous)

ZOO5CRT 01- CELL BIOLOGY AND MOLECULAR BIOLOGY

1. Course Instructors

Name	Programme, Semester and Batch	Email
Ms. Nimila P J	B.Sc. Zoology, Semester 5, 2016-17	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)	

3. Couse Outcomes:

On the successful completion of the course, students will have:

- The knowledge about the prokaryotic and eukaryotic cell, its complex organization.
- Understanding of the structure and function of the cell and the fundamentals for functioning of all living organisms.
- Insights into the mechanisms involved in the synthesis and function of macromolecules such as DNA, RNA, and proteins.
- An idea of the structure, replication and modification of the genetic material.
- Awareness of different cell organelles, their structure and role in living organisms.
- Critical thinking, skill and research aptitudes in basic and applied biology.
- The capacity to explain the nature of genetic material and gene concept.
- Capability of summarizing gene expression and gene regulations.

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 of cell and molecular biology	01-06-2016 02-06-2016	
Cell theory, Prokaryotes, Eukaryotes, Actinomycetes, Mycoplasmas, Virus, Virion and Viroids, Prions	03-06-2016 06-06-2016 07-06-2016 08-06-2016	Lectures

Cell membrane & Permeability Molecular models of cell membrane (Sandwich model, Unit membrane model, Fluid mosaic model) Modifications of plasma membrane. (Microvilli, tight junction, gap junction, desmosomes) Cell permeability - Diffusion, Osmosis, Passive transport, Active transport, Cell coat and Cell recognition.	09-06-2016 13-06-2016 14-06-2016 15-06-2016 16-06-2016	
Ultrastructure of Cytoplasm Cytoskeleton - Microtubules, microfilaments, intermediate filaments. Endoplasmic reticulum - Structure and functions Ribosomes (Prokaryotic and Eukaryotic) Golgi complex - Structure and functions. Lysosomes - Polymorphism - GERL concept, functions Mitochondria - Structure and functions Symbiont hypothesis.	17-06-2016 20-06-2016 21-06-2016 22-06-2016 23-06-2016 24-06-2016 27-06-2016 28-06-2016	Lectures
Nucleus Structure and functions of interphase nucleus, Nuclear membrane, pore complex, structure and functions of nucleolus Chromosomes - Structure; Heterochromatin, Euchromatin, Nucleosomes, Polytene chromosomes- Balbiani rings, Endomitosis, Lamp brush chromosomes.	29-06-2016 30-06-2016 01-07-2016 04-07-2016 05-07-2016 07-07-2016 08-07-2016 11-07-2016	Lectures
Cell Division Cell cycle - G1, S, G2 and M phases Mitosis and Meiosis Cell Communication Cell signalling - Signalling molelcules (neuro- transmitters, hormones, growth factors, cytokines, vitamin A and D derivatives) Role of cyclic AMP	12-07-2016 13-07-2016 14-07-2016 15-07-2016 18-07-2016 19-07-2016 20-07-2016	Lectures.

Nature of Genetic Materials Discovery of DNA as genetic material – Griffith's transformation experiments. Hershey Chase Experiment of Bacteriophage infection Structure and.types of DNA & RNA . . DNA replication. Modern concept of gene (Cistron, muton, recon, viral genes). Prokaryotic genome, Eukaryotic genome, Brief account of the following-- Split genes (introns and exons), Junk genes, Pseudogenes, Overlapping genes, Transposons	21-07-2016 22-07-2016 25-07-2016 26-07-2016 27-07-2016 28-07-2016 29-07-2016 01-08-2016 03-08-2016 04-08-2016	
Gene Expressions Central Dogma of molecular biology, One gene-one enzyme hypothesis, One gene-one polypeptide hypothesis. Characteristics of genetic code, Contributions of Hargobind Khorana. Protein synthesis-Transcription (Prokaryotic and eukaryotic) Reverse transcription,post transcriptional modifications, Translation, Post translational modifications.	05-08-2016 08-08-2016 09-08-2016 10-08-2016 11-08-2016 12-08-2016 15-08-2016 16-08-2016 17-08-2016 18-08-2016 19-08-2016 22-08-2016 23-08-2016	Lectures
Gene regulations Prokaryotic (inducible, repressible systems), Operon concept -Lac operon and Tryptophan operon. Brief account of Eukaryotic gene regulation, Definitions- Global control – Stimulon and modulon, Catabolite repression (Glucose effect).	25-08-2016 26-08-2016 29-08-2016 30-08-2016 31-08-2016 01-09-2016 02-09-2016 05-09-2016 06-09-2016 07-09-2016 08-09-2016 09-09-2016 19-09-2016 20-09-2016 21-09-2016 22-09-2016 23-09-2016	Lectures,

5. 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

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

6. Attendance (one component in class participation):

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

7. Suggested Readings:

1. Ariel G Loewy Philip Sickevitz, John R. Menninger and Jonathan A.N. Gallants (1991) Cell structure and function. Saunder's College Publication.
2. Arthur & Tania. (1991) DNA Replication. W.H. Freeman & Co. New York.
3. Arthur M Lesk. (1990) Introduction to Genomics. Oxford University Press
4. Carraway K.L. & C.A.C. Carraway. (2002) Cyto skeleton signalling, Oxford University Press
5. Charlotte J Avers. (1986) Molecular Cell Biology. The Benjamin / Cummings Publishing Company Inc.
6. Cohn N.S. 1979 Elements of Cytology (Freeman Book Company).
7. Daniel & Elizabeth. (1996) Genetics-Principle and Analysis. Jones & Bartlett Publishers
8. David A Micklos & Greg A Freyer. (2006) DNA Science. Cold Spring Harbor Laboratory Press
9. David Latchman. (2006) Gene Regulation. London Unwin Hyman
10. David M. J. Lilley. (2003) DNA-Protein Structural Interactions. Frontiers in Molecular Biology.
11. De- Robertis E.D. and De Robertis Jr.E.M.F (2002) Cell and Molecular Biology (Lea & Febiger/Info-Med)
12. Earl R Stadtman & P. Boon Chock. (2000) Current Topics in Cellular Regulation. Academic Press
13. Edwards & Hassall. Mc.Graw Hill Publishing Co.Ltd., U.K.
14. Gardner E.J. and Snustand D.P. Principles of Genetics. John Wiley & Sons, New York.
15. Gupta M.L. & M.L. Gangir. (1998) Cell Biology. Agrobotanica
16. James Darnell. (1998) Molecular Biology. Scientific American Books Inc.

17. Karp G. (1996) Cell and Molecular Biology: Concepts and Experiments John Wiley and Sons m, New York

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ZOO5CRT02 ENVIRONMENTAL BIOLOGY, TOXICOLOGY AND DISASTER MANAGEMENT

I. Course Instructor

Name	Sem, Programme & Batch	Email
Dr. M. L. Joseph	B.Sc. Zoology Semester 5 2016-17	joesphml@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)	5

III. Course Objectives:

- To impart basic knowledge on ecosystems and their functioning
- To learn about various types of anthropogenic pressures on ecosystem, relateddegradation and management measures
- To study toxicants, their impacts on human health and environment and remedialmeasures
- To create awareness about disasters, prevention and mitigation measures

IV. Course Delivery Plan

This course is enables the student to get the basic knowledge on ecosystems and their functioning . During this course the student learns about various types of anthropogenic pressures on ecosystem, related degradation and management measures. The teaching methods will include lectures, power point presenations and cross over learning.

Topics	Session No & Date(s)	Methodology and Duration
Topics **These are the topics to be covered in the modules**	Session No & Date(s)	Methodology and Duration
Introduction	1/6/2016	
History, development Scope, branches	2/6/2016	
Ecosystems: Concept, classification	3/6/2016	Lectures
Terrestrial ecosystem Abiotic/ biotic components Interactions	6/6/2016 7/6/2016	Power point presentations

Classification (Types) Forest	8/6/2016	
Desert Grassland : Causes of land	9/6/2016	
degradation with special reference to	13/6/2016	
Kerala Freshwater ecosystem	14/6/2016	
Physico chemical nature (Brief description	15/6/2016	
only) Types Lentic Lotic	16/6/2016	
Ground water :Threat to freshwater	17/6/2016	
resources of Kerala Watershed	20/6/2016	
management	21/6/2016	
Marine ecosystem :Physico chemical nature	22/6/2016	
(Brief description only)	23/6/2016	
Intertidal zone Rocky shore Muddy shore	24/6/2016	
Sandy shore Coral reefs	27/6/2016	
Open sea Pelagic realm Benthic realm	28/6/2016	
Wetland and mangroves Estuaries	29/6/2016	
Convention on wetlands (Ramsar, 1971)	30/6/2016	
Ramsar sites in Kerala –threats and	1/7/2016	
conservation aspects	4/7/2016	
	5/7/2016	
Man and Environment: Natural resources,	7/7/2016	Lectures
Non conventional, Introduction (concept)	8/7/2016	
Energy resources Inexhaustible, Energy	11/7/2016	
conservation measures	12/7/2016	
Global environmental changes	13/7/2016	
Global warming, Green house effect Ozone	14/7/2016	
depletion	15/7/2016	
Climate change (Brief description only)	18/7/2016	
Definition- recent developments Kyoto	19/7/2016	
protocolIPCC/UNFCC	20/7/2016	
Carbon credit Carbon sequestration Carbon	21/7/2016	
trading	22/7/2016	
Municipal Solid Waste: Plastic pollution	25/7/2016	
Types of plastics, Problems of plastics	26/7/2016	
Management strategies	27/7/2016	
Biowastes and their management. –aerobic	28/7/2016	
and anaerobic systems. e-waste, Major	29/7/2016	
types and sources Toxic ingredients	1/8/2016	
Effects on environment and human health	3/8/2016	
Management strategies	4/8/2016	
	5/8/2016	
Disaster Management	9/8/2016	Lectures
Classification	10/8/2016	
Natural Anthropogenic Hybrid	11/8/2016	
Earthquake Landslide Flood Drought	12/8/2016	Power point presentations
Cyclone Tsunami	15/8/2016	
Mitigation measures	16/8/2016	
	17/8/2016	
Toxicology: Definition	18/8/2016	
History of toxicology Classification –	19/8/2016	
occurrence/ source	22/8/2016	
Role of toxicology: Toxicants of biological	23/8/2016	
origin Afflatoxin	25/8/2016	
Botulinum toxin Heavy metal toxicants	26/8/2016	

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.

16. Ahuwalie V.K., Sunita Malhotra, 2009 Environmental science, Ane Books Pvt. Ltd. Alan Beeby, 2006 Anne – Maria Brennan First Ecology, Ecological principles and Environmental issues . International students edition Sec. edition Oxford University Press.

17. Andrew S. Pullin 2002 Conservation Biology. Cambridge University Press, Cambridge, UK

18. Banerjee, L.K., Sastry, A.R.K. and Nayar, M.P. 1989. Mangroves in India: Identification manual. Botanical Survey of India.

19. Bharucha, E. 2005. Textbook of Environmental Studies for Undergraduate Courses. University Grants commission

20. Miller, Tyler. G. (Jr) 2005. Essentials of Ecology. Thomson Brooks/cole.

21.Santra, S.C. 1994. Ecology Basic and Applied. M.D. Publications Pvt. Ltd. New Delhi.

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St. Albert's College (Autonomous)

ZOO5CRT03 EVOLUTION, ETHOLOGY & ZOOGEOGRAPHY

I. Course Instructor

Name	Sem, Programme & Batch	Email
Dr. Vincent Terrence Rebello	B.Sc. Zoology Semester 5 2016-17	terrence@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)	3

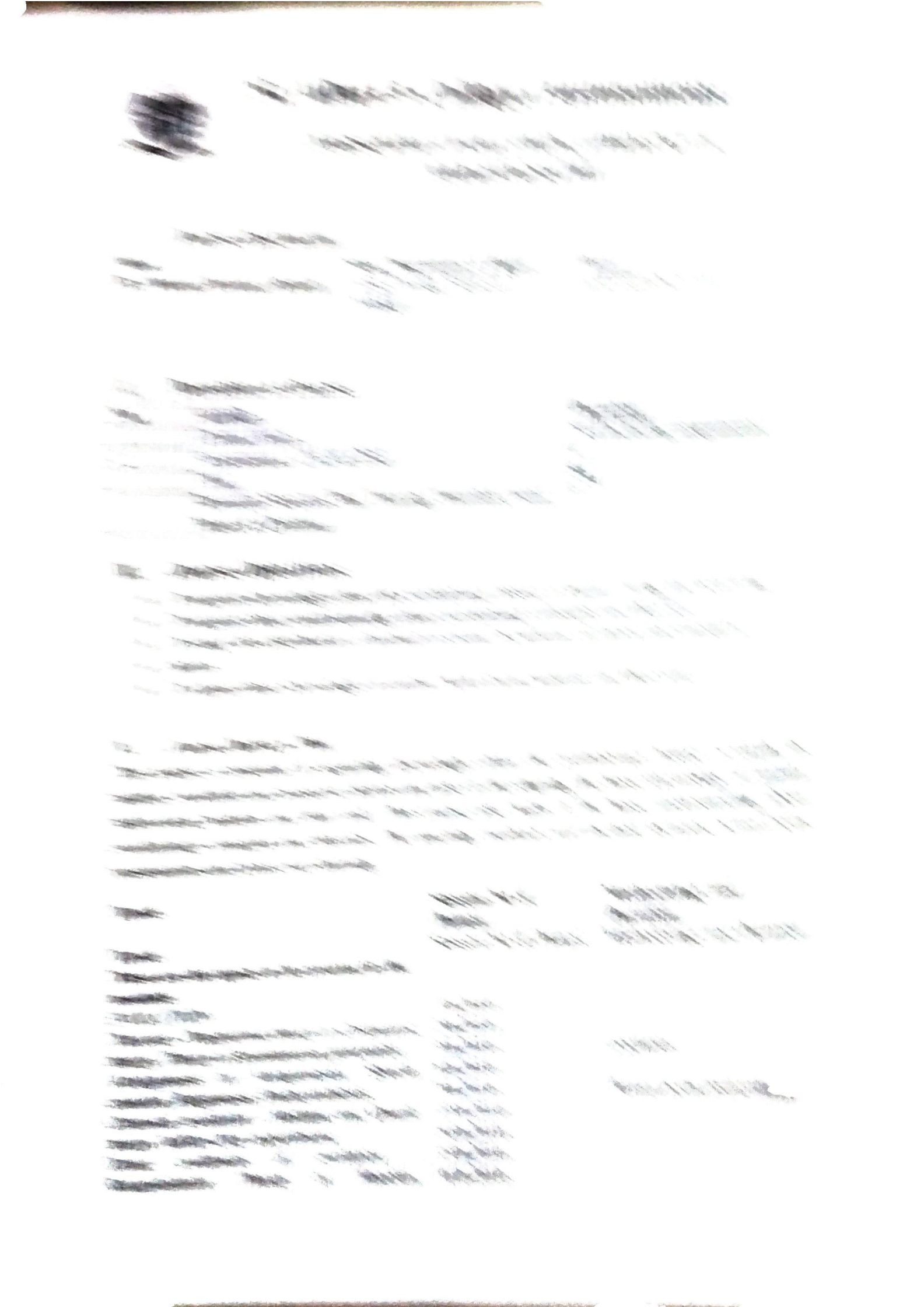
III. Course Objectives:

- To acquire knowledge about the evolutionary history of earth - living and nonliving
- To acquire basic understanding about evolutionary concepts and theories
- To study the distribution of animals on earth, its pattern, evolution and causative
- factors
- To impart basic knowledge on animal behavioural patterns and their role

IV. Course Delivery Plan

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

Topics	Session No & Date(s)	Methodology and Duration
Topics **These are the topics to be covered in the modules**	Session No & Date(s)	Methodology and Duration
EVOLUTION	1/6/2016	
Theories - Panspermia theory or Cosmozoic theory, Theory of spontaneous generation (Abiogenesis or Autogenesis), Special creation, Biogenesis, Endosymbiosis.	2/6/2016 3/6/2016 6/6/2016 7/6/2016	Lectures Power point presentations
Chemical evolution - Haldane and Oparin theory, Miller-Urey experiment;	13/6/2016 14/6/2016	
Direct evidences of evolution – Recapitulation Theory of Haeckel,	15/6/2016 16/6/2016	



Fossilization, Kinds of fossils, fossil dating,	17/6/2016	
Homologous organs and analogous organs.	20/6/2016	
Theories of organic evolution	21/6/2016	
Lamarckism and its Criticism, Weismann's	22/6/2016	
Germplasm theory, Darwinism and its	23/6/2016	
Criticism, Neo-Darwinism, Theory of De	24/6/2016	
Vries,	27/6/2016	
Population genetics and evolution: Hardy-	28/6/2016	
Weinberg Equilibrium, gene pool, gene frequency. Factors that upset Hardy-Weinberg Equilibrium, Effects of genetic drift on population: Bottleneck effect and founder effect		
Species and Speciation: Species concept,	8/7/2016	Lectures
subdivisions of species (sub species, sibling	11/7/2016	
species, cline and deme), Speciation: Types	12/7/2016	Museum specimen study
of speciation, Phyletic speciation	13/7/2016	
(autogenous and allogenous	14/7/2016	
transformations), True speciation,	15/7/2016	
Instantaneous and gradual speciation,	18/7/2016	
allopatric and sympatric speciation.		
Isolation: Types of isolating mechanisms-	19/7/2016	Lectures
Geographic isolation (mention examples)	20/7/2016	
and Reproductive isolation. Role of	21/7/2016	
isolating mechanisms in evolution.	22/7/2016	Power point presentations
Microevolution, Macroevolution (Adaptive	25/7/2016	
radiation -Darwin finches) Mega evolution,	26/7/2016	
Punctuated equilibrium, Geological time	28/7/2016	
scale, and Mass extinction (brief account only). Evolution of Horse		
ETHOLOGY	29/7/2016	Lectures
Introduction : Definition, History and scope	1/8/2016	
of ethology. Learning, imprinting and	3/8/2016	
behaviour.	4/8/2016	
Types of learning with examples; patterns	5/8/2016	
of behaviors – types of rhythms,	8/8/2016	
navigation, homing instinct, hibernation,	9/8/2016	
aestivation; pheromones- types and their	10/8/2016	
effect on behavior, hormones and their	11/8/2016	
action on behavior (aggressive and parental	12/8/2016	
behavior) Social organization.Social	15/8/2016	
organization in insects (ants) and mammals	16/8/2016	
(monkey), Courtship behaviour and	17/8/2016	
reproductive strategies	18/8/2016	
ZOOGEOGRAPHY	29/8/2016	Lectures
Continental drift theory, Types and means	30/8/2016	
of animal distribution, Factors affecting	31/8/2016	Power point presentations
animal distribution; insular fauna – oceanic	1/9/2016	
islands and continental islands,	2/9/2016	
Zoogeographical realms Palaearctic region,	5/9/2016	
Nearctic region, Neotropical region,	6/9/2016	
Ethiopian region, Oriental region,	7/9/2016	
Australian region (brief account with	8/9/2016	

Fossilization, Kinds of fossils, fossil dating.	17/6/2016	
Homologous organs and analogous organs.	20/6/2016	
Theories of organic evolution	21/6/2016	
Lamarckism and its Criticism, Weismann's Germplasm theory, Darwinism and its Criticism, Neo-Darwinism, Theory of De Vries,	22/6/2016 23/6/2016 24/6/2016 27/6/2016	
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	28/6/2016	
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.	8/7/2016 11/7/2016 12/7/2016 13/7/2016 14/7/2016 15/7/2016 18/7/2016	Lectures Museum specimen study
Isolation: Types of isolating mechanisms-Geographic isolation (mention examples) and Reproductive isolation. Role of isolating mechanisms in evolution.	19/7/2016 20/7/2016 21/7/2016 22/7/2016	Lectures Power point presentations
Microevolution, Macroevolution (Adaptive radiation -Darwin finches) Mega evolution, Punctuated equilibrium, Geological time scale, and Mass extinction (brief account only). Evolution of Horse	25/7/2016 26/7/2016 28/7/2016	
ETHOLOGY	29/7/2016	Lectures
Introduction : Definition, History and scope of ethology. Learning, imprinting and behaviour.	1/8/2016 3/8/2016 4/8/2016	
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	5/8/2016 8/8/2016 9/8/2016 10/8/2016 11/8/2016 12/8/2016 15/8/2016 16/8/2016 17/8/2016 18/8/2016	
ZOOGEOGRAPHY	29/8/2016	Lectures
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, Australian region (brief account with	30/8/2016 31/8/2016 1/9/2016 2/9/2016 5/9/2016 6/9/2016 7/9/2016 8/9/2016	Power point presentations

physical features and fauna, Wallace's line, Weber's line, Biogeography of India with special reference to Western Ghats. 9/9/2016

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 Classroom on or before 9am
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 Classroom on or before 9am

Note: Failure to upload 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. 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.

St. Albert's College (Autonomous)

Z0001-ZOO5CRT04 BIOCHEMISTRY, PHYSIOLOGY AND ENDOCRINOLOGY

I. Course Instructor

Name	Sem, Programme & Batch	Email
Prof. K. J. Benny	B.Sc. Zoology Semester V 2016-17	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, Assignments/Seminars etc.

Topics	Session No & Date(s)	Methodology and Duration

These are the topics to be covered in the modules **Part I. BIOCHEMISTRY** **Module 1 - GENERAL BIOCHEMISTRY, BIOELEMENTS AND BIOMOLECULES** **Carbohydrates, protein and lipids – structure basic compounds, classifications with examp and its biological importance.** **Module -2 METABOLISM** **Carbohydrate metabolism- Glycolysis, glycogenolysis, gluconeogenesis, glycolysis – citric acid cycle, ATP synthesis, Hexose, monophosphate shunt**	**01-06-2016** **02-06-2016** **03-06-2016** **07-06-2016** **08-06-2016** **09-06-2016**	**Lectures**
Lipid metabolism-Biosynthesisand oxidation of fatty acids-Beta oxidation, Physiologically important compounds synthesized from cholesterol. Protein metabolism- Deamination, transamination, transmethylation, ecarboxylation, ornithine cycle.	**20-06-2016** **21-06-2016** **22-06-2016** **23-06-2016** **24-06-2016**	**Lectures**
Module 3- ENZYMES Chemical nature of enzymes,	**04-07-2016** **05-07-2016** **07-07-2016** **08-07-2016**	**Lectures**

These are the topics to be covered in the modules **Part I. BIOCHEMISTRY** **Module 1 - GENERAL BIOCHEMISTRY, BIOELEMENTS AND BIOMOLECULES** **Carbohydrates, protein and lipids – structure basic compounds, classifications with examp and its biological importance.** **Module -2 METABOLISM** **Carbohydrate metabolism- Glycolysis, glycogenolysis, gluconeogenesis, glycolysis – citric acid cycle, ATP synthesis, Hexose, monophosphate shunt**	01-06-2016 02-06-2016 03-06-2016 07-06-2016 08-06-2016 09-06-2016	Lectures
Lipid metabolism-Biosynthesisand oxidation of fatty acids-Beta oxidation, Physiologically important compounds synthesized from cholesterol Protein metabolism- Deamination, transamination, transmethylation, ecarboxylation, ornithine cycle.	20-06-2016 21-06-2016 22-06-2016 23-06-2016 24-06-2016	Lectures
Module 3- ENZYMES Chemical nature of enzymes,	04-07-2016 05-07-2016 07-07-2016 08-07-2016	Lectures

These are the topics to be covered in the modules **Part I. BIOCHEMISTRY** **Module 1 - GENERAL BIOCHEMISTRY, BIOELEMENTS AND BIOMOLECULES** **Carbohydrates, protein and lipids – structure, basic compounds, classifications with examp and its biological importance.** **Module -2 METABOLISM** **Carbohydrate metabolism- Glycolysis, glycogenolysis, gluconeogenesis, glycolysis – citric acid cycle, ATP synthesis, Hexose, monophosphate shunt**	01-06-2016 02-06-2016 03-06-2016 07-06-2016 08-06-2016 09-06-2016	Lectures
Lipid metabolism-Biosynthesisand oxidation of fatty acids-Beta oxidation. Physiologically important compounds synthesized from cholesterol. Protein metabolism- Deamination, transamination, transmethylation, ecarboxylation, ornithine cycle.	20-06-2016 21-06-2016 22-06-2016 23-06-2016 24-06-2016	Lectures
Module 3- ENZYMES Chemical nature of enzymes	04-07-2016 05-07-2016 07-07-2016 08-07-2016	Lectures

mechanism of enzyme action, factors influencing enzyme action (temperature, pH, enzyme concentration, substrate concentration), enzyme activation, enzyme inhibition, allosteric enzyme, isoenzymes, co-enzyme.		
Part II. HUMAN PHYSIOLOGY **Module 4- NUTRITION** **Nutrients,classification,RDA,Balanced diet.** **Antioxidants and functions, Mineral metabolism,Role of Ca,Fe,Na,K,and P. Role of vitamins**	20-07-2016 21-07-2016 22-07-2016 25-07-2016	**GD, Lectures**
Food adulteration, Defects of modern food habits (importance of fibers in food), weight control, nutrition during pregnancy, breast feeding, anorexia, acidity and ulcers, flatulence, fasting and its significance, malfunctions of gastro intestinal tract. **Module 5 -RESPIRATION**	10-08-2016 11-08-2016 19-08-2016	**Lectures**

Gas transport, Factors affecting transport of respiratory gases through blood, oxy-hemoglobin curve, Bohr effect, reverse Bohr effect, Haldane effect, neural (voluntary and automatic) and chemical control (mention the role of carotid and aortic bodies) of respiration, smoking and its physiological effects, carbon monoxide poisoning, oxygen toxicity, nitrogen narcosis, dysbarism, oxygen therapy, artificial respiration, respiratory disorders –hypoxia, hypocapnia, hypercapnia, asphyxia.	23-08-2016 25-08-2016 26-08-2016 29-08-2016	Lectures
Module 6–CIRCULATION Cerebral circulation, blood brain barrier and cerebrospinal fluid, Haemo dynamic principles, formation and fate of blood cells, Blood composition ,blood clotting mechanism – intrinsic and extrinsic pathways, clotting factors, anticoagulants, blood transfusion (safety and security problems), mention haemostasis, haemolysis, jaundice, thrombosis, ESR.	30-08-2016 31-08-2016 01-09-2016 07-09-2016 08-09-2016	
Module 7 –EXCRETION Urea cycle (in detail), renal handling of individual substances eg. glucose, sodium, urea, water, factors affecting GFR, concept of plasma clearance, acid base balance and homeostasis, kidney disorders – acute renal failure, chronic renal failure-glomerular nephritis, pyelonephritis, nephrotic syndrome and kidney stones.	09-09-2016 19-09-2016 20-09-2016 21-09-2016 27-09-2016	Lectures
Module 8-MUSCLE PHYSIOLOGY Ultra structure of striated muscle.Mechanism	28-09-2016	

muscle contraction.Biochemistry of Muscle contraction,isotonic and isometric contraction.	29-09-2016 06-10-2016	
Electrical, chemical and morphological chang and ionic fluxes during contraction of striated muscle fibre, Cori cycle, electrophysiology of muscle, threshold and s potentials, simple muscle twitch, whole mus contraction, isotonic and isometric contraction, latent and refractory periods, summation, beneficial effect, superposition c tetanus, tonus, staircase phenomenon, fatigu oxygen debt, rigor mortis.	07-10-2016 17-10-2016 19-10-2016 20-10-2016 24-10-2016	
Module 9 –NEUROPHYSIOLOGY Synaptic transmission & properties of synaps neurotransmitters, role of dopamine and serotonin. EEG, memory, short term and long term sleep, dream, Neural disorders- dys Parkinson's disease, epilepsy, Alzheimer's d schizophrenia.	25-10-2016 26-10-2016 01-11-2016 02-11-2016	
Muscular, Respiratory and cardiovascular changes during exercise, dope test, drug abuse. Significance of exercise in body fitness.		
Part III ENDOCRINOLOGY Hormones as messengers, classification and types of hormones. General principles of hormone action, Concept of hormone receptors, hormonal control of homeostasis.	03-11-2016 04-11-2016 07-11-2016 08-11-2016	

muscle contraction.Biochemistry of Muscle contraction,isotonic and isometric contraction.	**29-09-2016** **06-10-2016**	
Electrical, chemical and morphological chang and ionic fluxes during contraction of striated muscle fibre, Cori cycle, electrophysiology of muscle, threshold and s potentials, simple muscle twitch, whole mus contraction, isotonic and isometric contraction, latent and refractory periods, summation, beneficial effect, superposition c tetanus, tonus, staircase phenomenon, fatigu oxygen debt, rigor mortis.	**07-10-2016** **17-10-2016** **19-10-2016** **20-10-2016** **24-10-2016**	
Module 9 –NEUROPHYSIOLOGY Synaptic transmission & properties of synaps neurotransmitters, role of dopamine and serotonin. EEG, memory, short term and long term sleep, dream, Neural disorders- dys Parkinson's disease, epilepsy, Alzheimer's d schizophrenia.	**25-10-2016** **26-10-2016** **01-11-2016** **02-11-2016**	
Muscular, Respiratory and cardiovascular changes during exercise, dope test, drug abuse. Significance of exercise in body fitness. Part III ENDOCRINOLOGY Hormones as messengers, classification and types of hormones. General principles of hormone action, Concept of hormone receptors, hormonal control of homeostasis.	**03-11-2016** **04-11-2016** **07-11-2016** **08-11-2016**	

Module 12 Secretion, Regulation, Functions and Disorders of hormones of Hypothalamus, Hypophysis, Pineal, Thyroid, Parathyroid, Thymus, Islets of Langerhans, Adrenal, Gonads, Placenta, Gastro intestinal hormones.	09-11-2016 11-11-2016	

V. Innovative Learning Programmes

Name of Programme	Duration	Type	Proposed Time

VI. Assignments and Seminars

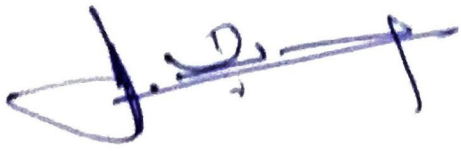
The following Assignment needs to be submitted as individual assignments.

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):

% of Attendance	Grade



Module V: Hormones, Regulations, Functions and Disorders of hormones of Hypothalamus, Hypophysis, Pineal, Thyroid, Parathyroid, Thymus, Islets of Langerhans, Adrenal, Gonads, Placenta, Gastro intestinal hormones	09.11.2016 to 11.11.2016	

V. Innovative Learning Programmes

Name of Programme	Duration	Type	Proposed Date

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 8TH 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):

% of Attendance	Grade

Above 90%	A
Between 85 and 90	B
Between 80 and 85	C
Between 75 and 80	D
Below 75	E

VIII. Required reading:

- Best and Taylor: Physiological basis of Medical practice
- Chakrabarti, Ghosh &: Human Physiology, the New Book StallSchana. Chatterjee C.C.: Human Physiology, Vol I & II Medical Allied Agency
- Eckert & Randall : Animal Physiology, Mechanism and Adaptations , CBS publishers, New Delhi.
- Ganong W F : Review of Medical Physiology, Mc Graw Hill, New Delhi. Guyton : Text Book of Medical Physiology Saunders
- Joshi : Nutrition and Dietetics , Tata Mc. Graw Hill
- Knut Schmidt Nilesen 2007 Animal Physiology – Adaptation and environment.
- Cambridge University press 5 th ed.
- Mackenna & Callander : Illustrated Physiology, Churchill Livingstone Powar Human Physiology
- Prosser & Brown : Comparative Animal Physiology
- Sarada Subramanyam & K. Madhavankutty : Textbook of human physiology, S. Chand & Co Ltd, New Delhi.
- Barrington, E.J.W. General and Comparative Endocrinology, Oxford, Clarendon Press. Bentley, P.J.Comparative Vertebrate Endocrinology, Cambridge University Press.
- David O. Norris Vertebrate Endocrinology 3th Edition,
- Gorbman ,A *et. al.* Comparative endocrinology, John Wiley &Sons.
- Hadley, M.E. 2000. Endocrinology, 5th ed. Prentice Hall,

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St. Albert's College (Autonomous)

ZOO5COT1-HUMAN GENETICS PUBLIC HEALTH AND SANITATION

1. Course Instructors

Name	Programme, Semester and Batch	Email
Prof. K J Benny Dr. M L Joseph Dr. Vincent Terrence Rebello Ms. Nimila P J	**B.Sc. Zoology, Semester 5, 2016-17**	bennykj@alberts.edu.in mljoseph@alberts.edu.in vincentterrence@alberts.edu.in nimilapj@alberts.edu.in

2. Duration of Course:

No.	Activity	Duration
1.	Contact Hours	50
2.	Assessment	4

3. Couse Outcomes:

On completion of the course, the learner should:

- Gain a general awareness regarding the real sense of health.
- Understand the role of balanced diet in maintaining health.
- Practice yoga and meditation in their day-to-day life.
- Gain an insight into life style diseases and their prevention.

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
Human normal chromosome complement. Genetic disorders in man. Chromosomal anomalies. Eg. Down Syndrome and Cridu chat syndrome. Sex chromosomal anomalies – Syndromes- Klinefelters Syndrome and Turners Syndrome. Single gene mutation disorders- Eg. Sickle Cell anaemia. Polygenic – Cleft lip and palate. Sex linked inheritance – Haemophilia and Colour blindness. Pre – natal Diagnosis (Amniocentesis, and Chorionic	02-06-2016 06-06-2016 07-06-2016 08-06-2016 09-06-2016 13-06-2016 14-06-2016 15-06-2016 16-06-2016 20-06-2016 21-06-2016	Lectures

St. Albert's College (Autonomous)

ZOOSCOT1-HUMAN GENETICS PUBLIC HEALTH AND SANITATION

1. Course Instructors

Name	Programme, Semester and Batch	Email
Prof. K J Benny Dr. M L Joseph Dr. Vincent Terrence Rebello Ms. Nimila P J	**B.Sc. Zoology, Semester 5, 2016-17**	bennykj@alberts.edu.in mljoseph@alberts.edu.in vincentterrence@alberts.edu.in nimilapj@alberts.edu.in

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St. Albert's College (Autonomous)

ZOO5COT1-HUMAN GENETICS PUBLIC HEALTH AND SANITATION

1. Course Instructors

Name	Programme, Semester and Batch	Email
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Villus Sampling) Ultra sound scanning and Fetoscopy Genetic Counselling Eugenics and Euthenics		
Human blood groups and their inheritance pattern Rh factor Blood transfusion – Universal Donor, Universal recipient – Importance of Blood donation DNA finger printing and applications – Probing to criminals – Method to resolve paternity and maternity disputes Causes of human infertility – a brief account; Human genome project – a brief account	22-06-2016 23-06-2016 27-06-2016 28-06-2016 29-06-2016 30-06-2016 04-07-2016 05-07-2016 07-07-2016	Lectures
Definition and Meaning of Health 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	11-07-2016 12-07-2016 13-07-2016 14-07-2016 18-07-2016 19-07-2016	Lectures
Nutrition and Health 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	20-07-2016 21-07-2016 25-07-2016 26-07-2016 27-07-2016 28-07-2016	Lectures
Safety Education and Health Promotion Principles of Accident prevention, Health and Safety in daily life, Health and Safety at work, First aid and emergency	01-08-2016 03-08-2016 04-08-2016	

Euthenics. Human blood groups and inheritance pattern. Rh factor Blood transfusion – Universal Donor, Universal recipient – Importance of Blood donation. DNA finger printing and applications – Probing for criminals – Method to resolve paternity and maternity disputes. Causes of human infertility – a brief account. Human genome project – a brief account.	23-06-2016 27-06-2016 28-06-2016 29-06-2016 30-06-2016 04-07-2016 05-07-2016 07-07-2016	
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Nutrition and Health 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	20-07-2016 21-07-2016 25-07-2016 26-07-2016 27-07-2016 28-07-2016	Lectures.
Safety Education and Health Promotion Principles of Accident prevention, Health and Safety in daily life. Health and Safety at work. First aid and emergency	01-08-2016 03-08-2016 04-08-2016	

Villus Sampling) Ultra sound scanning and Fetoscopy Genetic Counselling. Eugenics and Euthenics.		
Human blood groups and their inheritance pattern. Rh factor Blood transfusion – Universal Donor, Universal recipient – Importance of Blood donation. DNA finger printing and applications – Probing for criminals – Method to resolve paternity and maternity disputes. Causes of human infertility – a brief account. Human genome project – a brief account.	22-06-2016 23-06-2016 27-06-2016 28-06-2016 29-06-2016 30-06-2016 04-07-2016 05-07-2016 07-07-2016	Lectures
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Safety Education and Health Promotion Principles of Accident prevention, Health and Safety in daily life. Health and Safety at work. First aid and emergency	01-08-2016 03-08-2016 04-08-2016	

2. Assignments and Seminars

Assignments

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]
Seminar	[illegible]	[illegible]	[illegible]

Note: [illegible]

3. Attendance (one component in class participation)

Percentage	Marks
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	Not eligible for appearing the [illegible]

4. Suggested Readings

1. [illegible]
2. [illegible]
3. [illegible]
4. [illegible]
5. [illegible]
6. [illegible]

VIII. Required reading:

1. Arumugam. N. Text Book of Embryology. Saras Publication. (module I, Module II, Module III)
2. Balnisky B.I 1981 An Introduction to Embryology, W.B. Saunders and Co. Berril, N.J and Kars G. 1986. Developmental biology, Mc Graw Hills Berry A. K - An introduction to embryology.
3. Dutta 2007 Obstrestics , Chuch Livingston 17 Ed Gibbs (2006). Practical guide to developmental biology. Gilbert S. F - Developmental biology
4. Harrison , Harriosns Book of Internal Medicine Chruch Livingston 17th Ed. Jain P. C - Elements of developmental biology.
5. John Rigo Fundamental Genetics Cambridge University Press. 2009
6. Julio Collado Vides & Relf Hofestadt Gene Regulation and Metabolism Post genomic Computated Approaches, Ane Book 2004
7. Majumdar N. N - Vetebrate embryology
8. Melissa A – Gibbs, A practical Guide to Developmental Biology, Oxford university press (Int. student edition) 2006Dutta 2007 Obstrestics , Church Livingston 17 Ed
9. Majumdar N. N -1985 Vetebrate embryology; Tata McGraw-Hill, New Delhi
10. Melissa A & Gibbs, 2006; A practical Guide to Developmental Biology, Oxford university press (Int. student edition)
11. Scott F. Gilbert; 2003; Developmental biology; Sinauer Associates Inc.,U.S.; 7th Revised edition.
12. Vijayakumarn Nair, K. & George, P. V. 2002. A manual of developmental biology, Continental publications , Trivandrum
13. Taylor D J, Green NPO & G W Stout. (2008) Biological Science third edition. Cambridge University press. Ref pp 748 biology 755
14. Arora M.P. Embryology. Himalaya Publishing House (Module I, Module II, Module III) Suresh.C. Goel. Principles of Animal Developmental Biology. Himalaya Publishing House.
15. Sastry & Shukal. Developmental biology. Rastogi publications (Module I, Module II, Module III).

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St. Albert's College (Autonomous)

ZOO6CRT01 - REPRODUCTIVE AND DEVELOPMENTAL BIOLOGY

I. Course Instructor

Name	Sem. Programme & Batch	Email
Prof. K J Betsy	B.Sc. Zoology Semester 4 2016-17	betsy@stalbertscollege.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:

1. This will provide a basic understanding of the experimental methods and designs that can be used for further study and research.
2. 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 helps in the detailed understanding of the reproductive organs, gametogenesis and fertilization in the organisms. It also provides the students on the fundamentals of the embryology of chick, frog and humans and also in inspiring students awareness of current events in developmental biology.

Topics	Session No & Date(s)	Methodology and Duration
Topics **These are the topics to be covered in the modules**	Session No & Date(s)	Methodology and Duration
Scope of developmental biology, definition, sub-divisions (Descriptive, Comparative, Experimental and	14/11/2016 15/11/2016 17/11/2016	Lectures

Chemical). Early history of embryology. (Preformation and Epigenesis, Recapitulation theory or Biogenetic law, Germplasm theory (Weisman) Reproductive Organs and Gametogenesis. Human reproductive organs and gametogenesis (brief account) significance. Egg types. Classification of eggs, based on the amount, distribution and position of yolk. Mosaic, regulative and cleidoic eggs. Influence of yolk on development. Polarity, symmetry and egg content. Sexual cycle : Estrus cycle (non-primate) and menstrual cycle (primate cycle). Hormonal control of menstrual cycle. Approach and binding of spermatozoa, activation of the egg, amphimixis. Parthenogenesis (brief account) natural and artificial. Arrhenotoky, Thelytoky, Obligatory and Facultative	18/11/2016 21/11/2016 22/11/2016 23/11/2016 25/11/2016 28/11/2016 30/11/2016 1/12/2016	Power point presentations Technical sessions
Cleavage Types, planes of cleavage (radial and spiral with examples) Cell lineage (brief account). Holoblastic (equal, unequal) and Meroblastic cleavage (discoidal and superficial). Patterns of clevage (radial , bilateral and rotative). Influence of yolk on cleavage. Blastulation Blastula formation, Types of blastula (coeloblastula,stereoblastula,Discoblastula, Blastocyst with examples). Fate maps Concept of fate maps, construction of fate maps. (artificial and natural). A typical vertebrate fate maps. Significance of fate map. Gastrulation: Definition, Morphogenetic cell movements (brief account). Epiboly, Emboly (invagination, involution , delamination , convergence, divergence infiltration). Concept of germ layers (brief account) and its derivatives. Cell differentiation and gene action—with special reference to Drosophila. Totipotency, Pleuripotency, Unipotency of embryonic cells. Determination and	2/12/2016 5/12/2016 6/12/2016 7/12/2016 8/12/2016 9/12/2016 13/12/2016 14/12/2016 15/12/2016 16/12/2016 19/12/2016 20/12/2016 21/12/2016 6/1/2017 9/1/2017 10/1/2017 11/1/2017 12/1/2017	Lectures Museum specimen study Technical sessions

Chemical). Early history of embryology. (Preformation and Epigenesis, Recapitulation theory or Biogenetic law, Germplasm theory (Weisman) Reproductive Organs and Gametogenesis. Human reproductive organs and gametogenesis (brief account) significance. Egg types. Classification of eggs, based on the amount, distribution and position of yolk. Mosaic, regulative and cleidoic eggs. Influence of yolk on development. Polarity, symmetry and egg content. Sexual cycle : Estrus cycle (non-primate) and menstrual cycle (primate cycle). Hormonal control of menstrual cycle. Approach and binding of spermatozoa, activation of the egg, amphimixis. Parthenogenesis (brief account) natural and artificial. Arrhenotoky, Thelytoky, Obligatory and Facultative	18/11/2016 21/11/2016 22/11/2016 23/11/2016 25/11/2016 28/11/2016 30/11/2016 1/12/2016	Power point presentations Technical sessions
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differentiation in embryonic development, Gene action, control of gene expression. (brief accounts) Embryology of frog - Gametes,Fertilization,cleavage,blastulation ,fate map,gastrulation,notogenesis, neurulation,development of nervous system and sense organs(eye only) Metamorphosis (brief account only)		
Embryology of Frog: Gametes, fertilization, cleavage, blastulation, fatemap, gastrulation, neurulation, notogenesis. Differentaition of Mesoderm and Endoderm, Development of eye. Metamorphosis of frog, Hormonal and environmental. Embryology of chick: Structure of egg, fertilization, cleavage, blastulation, fate map, gastrulation. Development and role of Primitive streak, Salient features of 18hour, 24 hour, 33 hour & 48 hour chick embryo.Extra embryonic membranes in chick. Human development: Fertilisation, cleavage, blastocyst, implantation, placenta. Gestation, parturition and lactation.Human intervention in reproduction, contraception and birth control. Infertility, Invitro fertilization (test tube baby	13/1/2017 16/1/2017 17/1/2017 18/1/2017 19/1/2017 20/1/2017 23/1/2017 24/1/2017 25/1/2017 27/1/2017 30/1/2017 31/1/2017 1/2/2017 2/2/2017 3/2/2017 6/2/2017 7/2/2017 8/2/2017	Lectures Power point presentations Technical sessions
Teratology / Dysmorphology. Definition, Teratogen / Teratogenic agents. Ionizing radiation, infection (herpes virus, parvo virus-B 19, rubella virus, syphilis, cytomegalovirus , toxoplasmosis). Developmental defects Prenatal death (miscarriage and still birth). Intrauterine Growth Retardation (IUGR) Congenital abnormalities (birth defects) Structural defects (malformation, deformation, disruption) functional defects. (inborn errors of metabolism, mental retardation). Causes of malformation. (brief accounts.) Genetic disorders (single gene defects)	9/2/2017 10/2/2017 13/2/2017 16/2/2017 17/2/2017 20/2/2017	Lectures Power point presentations Problem based learning methods

Chromosome aberration, aneuploidy (numerical abnormalities. Structural abnormalities (deletion, insertion and re-arrangements) Chromosomal mosaicisms Environmental factors. (external factors) Chemicals, drugs, hormones and vitamins. Multifactorial and idiopathic disorders	

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	Best of two assignments are considered per courseA minimum of 2 class tests are to be attended. The grades of best 2 tests are to be taken
Seminar	PowerPoint presentation on given topic	PowerPoint Presentation for a presentation of 10 minutes duration	Wednesday of 8th Week of Course	The student has to take a minimum of 1 seminar per 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

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Chromosome aberration, aneuploidy (numerical abnormalities. Structural abnormalities (deletion, insertion and re-arrangements) Chromosomal mosaicisms Environmental factors. (external factors) Chemicals, drugs, hormones and vitamins. Multifactorial and idiopathic disorders	

V. Innovative Learning Programmes

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

K. J. BENNY
ASSOCIATE PROFESSOR & HEAD
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St. Albert's College (Autonomous)

ZOO6CRT02- MICROBIOLOGY AND IMMUNOLOGY

1. Course Instructors

Name	Programme, Semester and Batch	Email
Dr. Vincent Terrence Rebello	**B.Sc. Zoology, Semester 6, 2016-17**	**vincentterrence@alberts.edu.in**

2. Duration of Course:

No.	Activity	Duration
1.	Contact Hours	50
2.	Assessment	4

3. Couse Outcomes:

On completion of the course learner should 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
- Gain knowledge about the key concepts of immune system, its role in human health & well being
- Understand antigen antibody interactions as a tool for research and diagnosis
- Perform & interpret serological reactions for clinical diagnosis.
- Get an overview of infectious diseases and the role of various types of vaccines in controlling diseases.

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 and Scope of Microbiology. Outline classification of bacteria, fungi, viruses,	14-11-2016 15-11-2016 16-11-2016	Lectures
	17-11-2016	

Sterilization and disinfection. Different methods, physical and chemical. Sterilization by moist and dry heat, by filtration, by irradiation, preparation of culture media (aerobic and anaerobic cultivation) Selective media, enrichment media and differential media, Plating techniques and isolation of pure colonies, culture preservation techniques – refrigeration, deep freezing, freezing under liquid nitrogen and lyophilization. Morphology and fine structure of bacteria, size, shape and arrangements. Flagella, Pili, Capsule, cell wall and its composition, Cytoplasmic membrane, protoplast, spheroplast, nuclear material, cell inclusions, Bacterial spores.	18-11-2016 21-11-2016 22-11-2016 23-11-2016 24-11-2016 25-11-2016 28-11-2016 29-11-2016 30-11-2016 01-12-2016	Lectures
Bacterial Growth, Effect of various factors on bacterial growth. cell division., Nutritional requirements. Enumeration of bacteria; Total count & viable count Bacterial growth curve.	02-12-2016 05-12-2016 06-12-2016	Lectures
Viruses -Structure of Viruses Human, Animal, Plant and Bacterial Viruses. Replication of viruses, cultivation of animal and plant viruses. Viral assay	07-12-2016 08-12-2016 09-12-2016	Lectures.

Types, Primary and secondary infections Cross infection, nosocomial infection Infection, endogenous and exogenous infections, different sources of infections, contagious diseases (Epidemic, endemic and pandemic) modes of transmission of diseases (by food, water, air, vectors and carriers. Mention different types of carriers, healthy carriers, convalescent carriers, temporary and chronic carriers, contact carriers, paradoxical carriers, bacteraemia, Septicaemia	13-12-2016 14-12-2016 15-12-2016	Lectures
Diseases caused by different pathogens, epidemiology, symptomology, principles of laboratory diagnosis of Bacterial,viral and fungal diseases. A brief study of two examples from each category bacterial Tuberculosis & Typhoid Viral Infuenza & Polio Fungal Dermatophytoses & Candidiasis	16-12-2016 19-12-2016 20-12-2016 21-12-2016 22-12-2016 23-12-2016 02-01-2017 03-01-2017	Lectures
Types of immunity, innate immunity, Mechanism of innate immunity (eg Barriers, Phagocytosis, inflammation) acquired - passive & active Vaccines types of vaccines , live, killed toxoids,recombinant DNA	04-01-2017 05-01-2017 06-01-2017 09-01-2017	Lectures,
Types of Antigens, haptens, antigenic determinants. Basic structure of immunoglobulins. Different classes of immunoglobulins and functions Complement system, biological effects of complements Antigen-antibody reactions, Precipitation test, Agglutination Test, Clinical applications of antigen antibody reaction Eg: Widal , VDRL,	10-01-2017 11-01-2017 12-01-2017 13-01-2017 16-01-2017 17-01-2017 18-01-2017 19-01-2017 20-01-2017 23-01-2017	Lectures. Lectures.

HIV test (ELISA) Complement fixation test, Coombs test	24-01-2017 25-01-2017 27-01-2017	
Primary and secondary lymphoid organs. Cells of the immune system – Leucocytes, Lymphocytes T & B cells, Macrophages, Plasma cells, Memory cells, MHC Antibody synthesis, primary and secondary responses, Monoclonal antibodies – Hybridoma technology, uses.	30-01-2017 31-01-2017 01-02-2017 02-02-2017 03-02-2017 06-02-2017 07-02-2017 08-02-2017 09-02-2017	Lectures.
Immunopathology- immune disorders (Hypersensitivity, autoimmunity and immunodeficiency) 4hrs Different types of hypersensitivity reactions - A brief study on anaphylaxis, atopy, serum sickness and delayed hypersensitivity Autoimmunity, mechanisms of autoimmunization A brief study on autoimmune diseases eg. Lymphadenoid goiter,thyrotoxicosis, rheumatoid arthritis and systemic lupus erythematosis Transplantation Immunity - Graft rejection , major histocompatibility, Human leukocyte antigen system - (HLA) immuno -suppression Immunohaematology, Immunology of blood transfusion, Erythroblastosis foetalis.	10-02-2017 13-02-2017 14-02-2017 15-02-2017 16-02-2017 17-02-2017 20-02-2017 21-02-2017 22-02-2017 23-02-2017 27-02-2017 28-02-2017	

5. 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	Friday of 3th Week of Course

Seminar	PowerPoint presentation on given topic	PowerPoint Presentation.	Monday from 3rd Week of Course

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

6. Attendance (one component in class participation):

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

7. 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.

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ZOO6CRT03- GENETICS AND BIOTECHNOLOGY

1. Course Instructors

Name	Programme, Semester and Batch	Email
Dr. M L Joseph	B.Sc. Zoology, Semester 6, 2016-17	mljoseph@alberts.edu.in

2. Duration of Course:

No.	Activity	Duration
1.	Contact Hours	50
2.	Assessment	4
	Total	54

3. Couse Outcomes:

By the end of the course the learner will be able to

- Demonstrate working knowledge in a defined skill set of biotechnology protocols, including PCR, genetic mapping, and gene isolation and cloning.
- Basic as well as advance knowledge about the in vitro culture, maintenance and preservation of cells, tissues and organs.
- Become familiar with the tools and techniques of genetic engineering.

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: Scope and importance of genetics, Brief explanation of the following terms- gene, alleles, genotype, phenotype, genome, homozygous and heterozygous, wild type and mutant alleles, dominant and recessive traits, test cross and back cross, reciprocal cross, Mendelism – Mendel's laws , Mendelian traits in man Chromosome theory of heredity.	14-11-2016 15-11-2016 16-11-2016 17-11-2016 18-11-2016 21-11-2016 22-11-2016 23-11-2016 24-11-2016 25-11-2016 28-11-2016	Lectures
Allelic and non Allelic. Allelic-	29-11-2016	

incomplete dominance Co-dominance Non allelic interactions, – complementary supplementary, epistasis – dominant (feather colour in fowl) and recessive (coat colour in mice) Polygenes (Skin colour inheritance in man) pleiotropism, modifying genes, lethal genes (Brief account with one example each) Multiple alleles(eg) Coat Colour in rabbits. Man ABO blood group Rh factor, Blood group and its inheritance	30-11-2016 01-12-2016 02-12-2016 05-12-2016 06-12-2016 07-12-2016 08-12-2016	Lectures
Linkage and recombination of genes based on Morgan's work in Drosophila (Complete and incomplete linkage). Linkage map Chromosome mapping Chromosome theory of sex determination (sex chromosomes and autosomes) chromosomal mechanism (XX-XO, XX-XY, ZW-ZZ) Barr bodies and Lyon hypotheses: Sex determination in man- role of Y chromosome. Sex determination in honey bees. Genic balance theory. Drosophila-intersex, gynandromorphs. Hormonal Influence on sex determination Environmental influence - Hermaphroditism	09-12-2016 13-12-2016 14-12-2016 15-12-2016 16-12-2016 19-12-2016 20-12-2016 21-12-2016 22-12-2016 23-12-2016	Lectures
Mutations, Types of Mutations. Germinal, Sex linked mutations. Chromosomal mutations - structural and numerical changes. Gene mutation (point mutation) Molecular basis of gene mutations – tautomerism- Induced mutations Physical and chemical mutagens. Extra nuclear inheritance (Cytoplasmic inheritance Characteristics: Organella DNA (Mitochondrial and plastid DNA) Kappa particles in paramecium	02-01-2017 03-01-2017 04-01-2017 05-01-2017 06-01-2017 09-01-2017 10-01-2017 11-01-2017 12-01-2017 13-01-2017 16-01-2017	Lectures.
Bacterial genome Recombination in Bacteria – Bacterial transformation.	17-01-2017	

incomplete dominance Co-dominance Non allelic interactions, – complementary supplementary, epistasis – dominant (feather colour in fowl) and recessive (coat colour in mice) Polygenes (Skin colour inheritance in man) pleiotropism, modifying genes, lethal genes (Brief account with one example each) Multiple alleles(eg) Coat Colour in rabbits. Man ABO blood group Rh factor, Blood group and its inheritance	30-11-2016 01-12-2016 02-12-2016 05-12-2016 06-12-2016 07-12-2016 08-12-2016	Lectures
Linkage and recombination of genes based on Morgan's work in Drosophila (Complete and incomplete linkage). Linkage map Chromosome mapping Chromosome theory of sex determination (sex chromosomes and autosomes) chromosomal mechanism (XX-XO, XX-XY, ZW-ZZ) Barr bodies and Lyon hypotheses: Sex determination in man- role of Y chromosome. Sex determination in honey bees. Genic balance theory. Drosophila-intersex, gynandromorphs. Hormonal Influence on sex determination Environmental influence - Hermaphroditism	09-12-2016 13-12-2016 14-12-2016 15-12-2016 16-12-2016 19-12-2016 20-12-2016 21-12-2016 22-12-2016 23-12-2016	Lectures
Mutations, Types of Mutations. Germinal, Sex linked mutations. Chromosomal mutations - structural and numerical changes. Gene mutation (point mutation) Molecular basis of gene mutations – tautomerism- Induced mutations Physical and chemical mutagens. Extra nuclear inheritance (Cytoplasmic inheritance Characteristics: Organella DNA (Mitochondrial and plastid DNA) Kappa particles in paramecium	02-01-2017 03-01-2017 04-01-2017 05-01-2017 06-01-2017 09-01-2017 10-01-2017 11-01-2017 12-01-2017 13-01-2017 16-01-2017	Lectures.
Bacterial genome Recombination in Bacteria – Bacterial transformation.	17-01-2017	

Transduction, conjugation F mediated sex duction. Resistance transfer factor (RTF) Mechanism of drug resistance in bacteria Transposable genetic elements in bacteria, basic components and mechanisms of transposition in bacteria.	18-01-2017 19-01-2017 20-01-2017 23-01-2017 24-01-2017 25-01-2017	Lectures
Karyotyping- Normal human chromosome complement. Pedigree Analysis Aneuploidy and Non disjunction. Genetic disorders in Man. Chromosomal anomalies Autosomal (eg. Down syndrome, Edward's syndrome and Cridu chat syndrome) Sex chromosomal anomalies (Klinefelter's syndrome, and Turners syndrome) Single gene disorders Gene mutation and disorders (Brief mention) Autosomal single gene disorders (Sickle cell anaemia, brachydactyly; inborn errors of metabolism such as phenyle ketonuria, alkaptonuria). Sex linked inheritance. Definition - characteristics criss-cross inheritance. Haemophilia and colour blindness. Pseudoautosomal genes (incompletely sex-linked genes and holandric genes. Multifactorial disorders - Polygenic traits - Cleft lip and cleft palate. Sex limited and sex influenced traits in man with examples. Prenatal Diagnosis (Amniocentesis) and choriovillus sampling - Ultrasound scanning and Fetoscopy. Genetic counselling, Eugenics and Euthenics.	27-01-2017 30-01-2017 31-01-2017 01-02-2017 02-02-2017 03-02-2017 06-02-2017 07-02-2017 08-02-2017 09-02-2017 10-02-2017 13-02-2017 14-02-2017	Lectures,
Basic aspects of Genetic Engineering. Tools-Enzymes-Restriction enzymes and DNA ligases. Vectors-Plasmids and Phage vectors.	15-02-2017 16-02-2017 17-02-2017 20-02-2017 21-02-2017	

Isolation of gene/DNA. Techniques- Production of recombinant DNA. Briefly mention rDNAtransfer and screening methods. Cloning in host cells. Virus mediated gene transfer, DNA mediated gene transfer Techniques in gene cloning; PCR technique and DNA Amplification. Blotting Techniques- Southern Blotting Northern Blotting Western Blotting DNA hybridization DNA finger printing and its applications. RFLP- markers Applications. Gene libraries, Genomic and cDNA libraries Human DNA library, Construction of genomic library and cDNA library. Stem cell cultures, Therapeutic cloning, human ES cell cultures, Human EG cell cultures and Human EC cell cultures, Potential uses of stem cells. Animal cell and tissue culture.	22-02-2017 23-02-2017 27-02-2017 28-02-2017	
Practical Applications of Biotechnology Bioremediation. Biotechnology and Medicine: Pharmaceuticals and Biopharmaceuticals Biotechnology in agriculture and forestry Animal biotechnology – Genetic Engineering for transgenic animals. Fermentation technology in food and beverages. Problems in Biotechnology	01-03-2017 02-03-2017 03-03-2017 06-03-2017 07-03-2017 08-03-2017 09-03-2017	

5. 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

Seminar	PowerPoint presentation on given topic	PowerPoint Presentation.	Thursday of 5th Week of Course

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

6. Attendance (one component in class participation):

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

7. Suggested Readings:

1. Bala Subramanian D., C.F & Bryle & K. Dharmarajan J. Green Kunthala Jayaraman, Concept in Biotechnology. University Press 2007
2. Benjamin Lewin 2004 Gene VIII Oxford University Press
3. Brown C.H., Campbell I & Priest F, G. 1987. Introduction of Biotechnology (Blackwell scientific publishers Oxford)
4. C.W. Fox, J.B. Wolf Evolutionary Genetics Concept of Case Studies, Oxford university Press 2006
5. Colin Ratledge & Bijorn Kristiansen, Basic Biotechnology 3 rd ed. Cambridge University (2008)
6. De Robertis E.D. and De. Robertis E.M. 1987 cell & Molecular Biology (Lea & Febya Info- Med)
7. Desmand S.T. Nicholi An introduction to Genetic Engineering Cambridge Sec, Ed. 2007.
8. Frank H, Stephenson Calculation for Molecular Biology and Biotechnology . Academic press 2006
9. Gardner E.J. and Snustand D.P. 1984. Principles of Genetcis (John Wiley & Sons New York.)
10. Gerhard Fuchs. Biotechnology & in Corporative Perspective. Study in global Competition series, Ane Book 2003
11. Jan Vijay Aging of the Genome The dual role of DNA in life and Deaths. Oxford university Press 2008
12. Janarthanan S & Vincent S., Practical Biotechnology, Method of Protocols. University Press . 2007
13. John E. Smith Biotechnology Cambridge Low priced ed. (Third Ed) 2005
14. Madingan , Martinko and Parker 2002, Biology of Microorganisms , Brock Eighth Ed. Prentice Hall
15. Powar. C.B. 1983. Cell biology (Himalaya Publishing company)
16. Prave D. Faustu and Sitting W and Subasten D.A (Eds) 1987 Fundamentals of Biotechnology (VCH publishers. Germany)
17. R.C. Sobte and Suparna. S. Pachauri. Essentials of Biotechnology Ane Book Pvt. Ltd. 2009
18. Singh B.D. Biotechnology 2002, Kalyan Publishers New Delhi.

St. Albert's College (Autonomous)

ZOO6CRT04-GENERAL INFORMATICS, BIOINFORMATICS AND BIOSTATISTICS

1. Course Instructors

Name	Programme, Semester and Batch	Email
Ms. Nimila P J	**B.Sc. Zoology, Semester 6, 2016-17**	**nimilapj@alberts.edu.in**

2. Duration of Course:

No.	Activity	Duration
1.	Contact Hours	50
2.	Assessment	4
	Total	54

3. Couse Outcomes:

On completion of the course learner will be able to;

- Develop systematic approach in analyzing biological information using computer aided tools.
- To use computers in data acquisition and processing and use available software as a tool in data analysis.
- Expand basic informatics skills and attitudes relevant to the emerging knowledge of society.
- Effectively utilize the digital knowledge resources in learning.
- Use Fundamental statistical concepts and some of their basic applications in science and society.

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
Microprocessors – RAM, ROM, EPROM, Memory systems, input, output devices. Disk operating systems, booting, formatting. DOS, Windows, Linux (only basics), MS Office (MS word, Excel, Access and PowerPoint) computer	14-11-2016 15-11-2016 16-11-2016 17-11-2016 18-11-2016 21-11-2016 22-11-2016 23-11-2016	Lectures

programming, Networking (LAN, WAN), Internet, World Wide Web, Databases and information retrieval. New technology in Internet	24-11-2016 25-11-2016 28-11-2016 29-11-2016 30-11-2016	
Definition, Nature & Scope of Bioinformatics - Contrast between Bioinformatics and Computational Biology; Key Bio-sequences in Molecular Biology - DNA, RNA and Amino-acid sequences -Popular Databases in Bioinformatics - NCBI, DDJB, PDB, OMIM; BLAST & FASTA sequence file formats, Approach of Comparative Biology based on sequence comparison - The basic idea of sequence comparison (algorithms not required) - idea of scoring matrices.	01-12-2016 02-12-2016 05-12-2016 06-12-2016 07-12-2016 08-12-2016 09-12-2016 13-12-2016 14-12-2016 15-12-2016 16-12-2016 19-12-2016 20-12-2016 21-12-2016 22-12-2016 23-12-2016	Lectures
The Blast search engine - important features - Idea of Multiple sequence alignment – Proteomics: Basic ideas of Protein Structure prediction- Concept of Homology Modeling- Idea of Molecular Phylogenetics - advantages and computational procedure (only description of use of a package such as Phylip)-	02-01-2017 03-01-2017 04-01-2017 05-01-2017 06-01-2017 09-01-2017 10-01-2017 11-01-2017 12-01-2017 13-01-2017 16-01-2017	Lectures
Basic concepts of computer Aided Drug Discovery- General description of drug discovery pipeline- concept of Personalized medicine; Bioinformatics tools: (i)Molecular Visualization Software - Rasmol (Basic features only) - (ii) ORF finding (iii) gene finding, (iii) BLAST (iv) Hydrophobicity Prediction (v) Single Nucleotide Polymorphism (SNP) prediction using GENSNIP Human brain Project Computer simulation and	17-01-2017 18-01-2017 19-01-2017 20-01-2017 23-01-2017 24-01-2017 25-01-2017 27-01-2017 30-01-2017 31-01-2017	Lectures

visualization of molecular structure Protein structure prediction.	
Collection of data, Classification of data, Frequency distribution tables, Graphical representation: - Bar diagrams, Histogram, Pie diagram and Frequency curves. Mean, Median, Mode Range, Quartile Deviation, Mean Deviation, Standard Deviation, Standard error. (Merits & demerits). Normal, Binomial, Poisson distribution Definition, Types of correlation. Basic concept, Levels of significance, test of significance, Procedure for testing hypothesis, types of hypothesis- Null hypothesis and Alternate hypothesis. Chi- square test.	01-02-2017 02-02-2017 03-02-2017 06-02-2017 07-02-2017 08-02-2017 09-02-2017 10-02-2017 13-02-2017 14-02-2017 15-02-2017 16-02-2017 17-02-2017 20-02-2017 21-02-2017 22-02-2017 23-02-2017 27-02-2017 28-02-2017

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
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
90-100%	3
80-90%	2
75-80	1
<75	Not eligible for appearing for ESE

8. **Suggested Readings:**

1. Campell, R. 1990. Statistics for biologists. CBS Publishers and distributors.
2. Chavali. L.N. 2009 Bioinformatics & Bioprogramming in Cambridge University press
3. David. G. Kleinbaum and Mitchel Klein 2009 Survival analysis Statistics for Biology & Health 2nd .Ed. Springer International ed.
4. Jin Xiang 2008 Essential Bioinformatics 1st Ed. Cambridge University Press.
5. Khan and Khanum, 1990 Fundamentals of biostatistics
6. Neil C.Jones and Pavel A.Pevzner. 2004An introduction to Bioinformatics Algorithms. Ane Book Pvt Ltd.
7. Nikolay Kolchamvov and Ralf Hofestaedt-2008 Bioinformatics of Genome Regulation and structure. Springer international Ed.
8. Norman T.J. Bailey Statistical methods in biology 2007 Cambridge University press.
9. Paul.G. Hegg'sand Teresa . K. Altwood- 2005., Bioinformatics and Molecular Evolution Blackwell publishers.
10. Pennington S.R. and M.J. Dunn. Proteomics.2005 Ane Books.
11. Rastogi, V.B .2009. Fundamentals of Biostatistics, Ane Books Pvt. Ltd. New Delhi.
12. Warren J.Ewens, Gregory .R.Grant. 2008. Statistical methods in Bioinformatics an Introduction.

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Z0001-ZOO6CRT05 NUTRITION, COMMUNITY HEALTH AND SANITATION

I. Course Instructor

Name	Sem, Programme & Batch	Email
Dr. M. L. Joseph	B.Sc. Zoology Semester VI 2016-17	mljoseph@alberts.edu.in
Dr. Vincent Terrence Rebello	B.Sc. Zoology Semester VI 2016-17	vincentterrence@alberts.edu.in
Prof. K. J. Benny	B.Sc. Zoology Semester VI 2016-17	bennykj@alberts.edu.in
Mrs. Nimila P. J.	B.Sc. Zoology Semester VI 2016-17	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:

- To develop critical thinking skill and research aptitude among students, by introducing the frontier areas of the biological science.
- To emphasize the central role that biological sciences play in the life of all organisms.
- To introduce the student to some of the present and future applications of bio- sciences

IV. Course Delivery Plan

This course is a course requiring a 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
These are the topics to be covered in the modules PART – I NUTRITION AND COMMUNITY HEALTH Module I Definition and Meaning of Health 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 Module II Nutrition and Health 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 Module III Safety Education and Health Promotion Principles of Accident prevention, Health and Safety in daily life. Health and Safety at work.	14-11-2016 15-11-2016 16-11-2016 17-11-2016 18-11-2016 21-11-2016 22-11-2016 23-11-2016 24-11-2016 25-11-2016 28-11-2016 29-11-2016 30-11-2016 01-12-2016 02-12-2016 05-12-2016 06-12-2016 07-12-2016 08-12-2016 09-12-2016 13-12-2016 14-12-2016 15-12-2016 16-12-2016 19-12-2016 20-12-2016 21-12-2016 22-12-2016 23-12-2016 02-01-2017 03-01-2017	Lectures,, GD

PART II COMMUNITY HEALTH AND SANITATION Module V Public health and water quality. Prevention of Water borne diseases. Potable water quality monitoring and waste water management. Faecal bacteriae and pathogenic microorganisms transmitted by water. Cholera and Typhoid. Determination of sanitary quality of drinking water, water purification techniques – Methods of waste water treatment and disposal Physical and Biological treatment – Anaerobic digesting system Septic tank method, Aerobic process – Oxidation ponds, trickling filters, activated sludge processes – Vermi composting a method of solid waste management	19-01-2017 20-01-2017 23-01-2017 24-01-2017 25-01-2017 27-01-2017 30-01-2017 31-01-2017 01-02-2017 02-02-2017 03-02-2017 06-02-2017 07-02-2017 08-02-2017	Lectures
Module VI Public Health and Food borne diseases. Their preventive measures. Food poisoning caused by toxins produced by microbes eg Staphylococcal food poisoning, Botulism, Salmonellosis. Food infection caused by growth of microorganisms in the human body after the contaminated food has been eaten. Eg Food Infection hepatitis (hepatitis A)	09-02-2017 10-02-2017 13-02-2017 14-02-2017 15-02-2017 16-02-2017 17-02-2017 20-02-2017 21-02-2017 22-02-2017	Lectures
		Lectures

.Module VII Public health and diseases Emerging pathogens and diseases - Swine Flue (H1N1), Bird Flue (H5N1), SARS, Anthrax, Reemerging pathogens and diseases –TB, Chikungunya) Vectorborne (mosquito) diseases and their control measures Chikungunya , Malaria, Filariasis and Dengu fever) Mosquito eradication Leptospirosis and preventive measures – Rodent control measures. Cancer – Types of cancers, Carcinogens, Causes of Cancer, Morphological Structural Biochemical & behavioural changes of cancer cells.	**23-02-2017** **27-02-2017** **28-02-2017** **01-03-2017** **02-03-2017** **03-03-2017**	

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)

% of Attendance	Grade
Above 90%	A
Between 85 and 90	B
Between 80 and 85	C
Between 75 and 80	D
Below 75	E

VIII. Required reading:

- **Fashey, Tomas D, Insel, Paul M and Roth Walt (2005) Fit and Well. New York; Mc Graw Hill Inc**
- **Greenberg, Jerol S and Dintiman George B (1997) Wellness Creating a life of Health and Fitness , London Allyn and Bacon Inc.**
- **Edlen Gordon Janes and Barttlet. Human Genatics a modern Synthesis Published by Boston.**
- **Monica Cheesbrough, Laboratory Manual for Tropical Countries Vol II LBS. Norman Bezzaant HELP First Aid for everyday emergencies. Jaico Publishing House,**
- **Bombay, Delhi**
- **Pelczar M.J. Jr. E.C.S. Chane & N.R. Krieg, Microbiology (Concept & Applications) Rai. B.C. Health Education and Hygiene. Published by Prakashan Kendra, Lucknow Tom Sanders and Peter Emery (2004) Molecular basis of human nutrition: Taylor &**
- **Francis Publishers Ane Book**

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