

SACRED HEART COLLEGE (AUTONOMOUS)

DEPARTMENT OF ZOOLOGY

BACHELOR OF SCIENCE IN ZOOLOGY

Course plan

Academic Year 2015 – 16

Semester 5

COURSE PLAN
CELL BIOLOGY AND MOLECULAR BIOLOGY

COURSE OBJECTIVES

To emphasize the central role of Cell biology and Molecular biology, being the most developing areas of biological science.

To make aware of different cell organelles, their structure and role in living organisms.

To introduce the nature of genetic materials at molecular level, their expression and regulation.

To develop critical thinking, skill and research aptitudes.

Basic Reference

Zoological Society of Kerala Study material. 2002. Cell Biology and molecular biology

| TEACHER I | | | |
|-----------|---|--|---------|
| Sessions | Topic | Method | Remarks |
| | CELL BIOLOGY | | |
| | Module I History of cell and molecular biology | | |
| 1 | Cell theory, Prokaryotes, Eukaryotes | ICT Enabled (ppt& images, charts, video clippings) | |
| 2 | Actinomycetes, Mycoplasmas, Virus, Virion and Viroids, Prions | ICT Enabled (ppt& images, charts, video clippings) | |
| | Module II Cell membrane & Permeability | | |
| 3 | Molecular models of cell membrane (Sandwich model, Unit membrane model, Fluid mosaic model) | ICT Enabled (ppt& images, charts, video clippings) | |

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| 4 | Modifications of plasma membrane. (Microvilli, tight junction, gap junction, desmosomes) | ICT Enabled (ppt& images, charts, video clippings) | |
| 5 | Cell permeability - Diffusion, Osmosis, Passive transport, Active transport, Cell coat and Cell recognition | ICT Enabled (ppt& images, charts, video clippings) | |
| | Module III Ultrastructure of Cytoplasm | | |
| 6 | Cytoskeleton - Microtubules, microfilaments, intermediate filaments | ICT Enabled (ppt& images, charts, video clippings) | |
| 7 | Endoplasmic reticulum - Structure and functions | ICT Enabled (ppt& images, charts, video clippings) | |
| 8 | Ribosomes (Prokaryotic and Eukaryotic) | ICT Enabled (ppt& images, charts, video clippings) | |
| 9 | Golgi complex - Structure and functions | ICT Enabled (ppt& images, charts, video clippings) | |
| 10 | Lysosomes - Polymorphism - GERL concept, functions | ICT Enabled (ppt& images, charts, video clippings) | |
| 11 | Mitochondria - Structure and functions | ICT Enabled (ppt& images, charts, video clippings) | |
| 12 | Symbiont hypothesis | ICT Enabled (ppt& images, charts, video clippings) | |

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| 13 | I CIA | Descriptive test 1 hr | |
| | Module IV Nucleus | | |
| 14 | Structure and functions of interphase nucleus, | ICT Enabled (ppt& images, charts, video clippings) | |
| 15 | Nuclear membrane, pore complex | ICT Enabled (ppt& images, charts, video clippings) | |
| 16 | Structure and functions of nucleolus | ICT Enabled (ppt& images, charts, video clippings) | |
| 17 | Chromosomes | ICT Enabled (ppt& images, charts, video clippings) | |
| 18 | Structure - Heterochromatin, Euchromatin, Nucleosomes | ICT Enabled (ppt& images, charts, video clippings) | |
| 19 | Polytene chromosomes-Balbiani rings, Endomitosis | ICT Enabled (ppt& images, charts, video clippings) | |
| 20 | Lamp brush chromosomes | ICT Enabled (ppt& images, charts, video clippings) | |
| | Module V Cell Division | | |
| 21 | Cell cycle - G ₁ , S, G ₂ and M phases | ICT Enabled (ppt& images, charts, video clippings) | |

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| 22 | Mitosis | ICT Enabled (ppt& images, charts, video clippings) | |
| 23 | Meiosis | ICT Enabled (ppt& images, charts, video clippings) | |
| 24 | Meiosis | ICT Enabled (ppt& images, charts, video clippings) | |
| | Module VI Cell Communication | | |
| 25 | Cell signalling - Signalling molecules | ICT Enabled (ppt& images, charts, video clippings) | |
| 26 | Neuro- transmitters, hormones, growth factors, cytokines, vitamin A and D derivatives | ICT Enabled (ppt& images, charts, video clippings) | |
| 27 | Role of cyclic AMP | ICT Enabled (ppt& images, charts, video clippings) | |
| | PART II - MOLECULAR BIOLOGY | | |
| | Module IX Gene regulations | | |
| 28 | Prokaryotic (inducible, repressible systems) | ICT Enabled (ppt& images, charts, video clippings) | |
| 29 | Operon concept -Lac operon | ICT Enabled (ppt& images, charts, video clippings) | |

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| 30 | Tryptophan operon | ICT Enabled (ppt& images, charts, video clippings) | |
| 31 | Brief account of Eukaryotic gene regulation | ICT Enabled (ppt& images, charts, video clippings) | |
| 32 | Definitions- Global control – Stimulon and modulon | ICT Enabled (ppt& images, charts, video clippings) | |
| 33 | Catabolite repression (Glucose effect) | ICT Enabled (ppt& images, charts, video clippings) | |
| 34 | Class Test 1 | Descriptive | |
| 35 | Class Test 2 | Descriptive | |
| | II CIA | | |
| 36 | Revision and Evaluation | | |
| | PART II - MOLECULAR BIOLOGY | | |
| | Module VII Nature of Genetic Materials | | |
| TEACHER II | | | |
| 1 | Discovery of DNA as genetic material – Griffith's transformation experiments. | ICT Enabled (ppt& images, charts, video clippings) | |
| 2 | Hershey Chase Experiment of Bacteriophage infection | ICT Enabled (ppt& images, charts, video clippings) | |

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| 3 | Structure and types of DNA & RNA . | ICT Enabled (ppt & images, video clippings) | |
| 4 | DNA replication. | ICT Enabled (ppt & animations, images, video clippings) | |
| 5 | Modern concept of gene (Cistron, muton, recon, viral genes). Prokaryotic genome, Eukaryotic genome, | ICT Enabled (ppt & images, video clippings) | |
| 6 | CIA - I | 1 hr; descriptive answers only | |
| 7 | Split genes (introns and exons), Junk genes, Pseudogenes, Overlapping genes, Transposons | ICT Enabled (ppt & images, video clippings) | |
| | Module VIII Gene Expressions | | |
| 8 | Central Dogma of molecular biology, | ICT Enabled (ppt & images, video clippings) | |
| 9 | One gene-one enzyme hypothesis, One gene-one polypeptide hypothesis. | ICT Enabled (ppt & images, charts, video clippings) | |
| 10 | Characteristics of genetic code, Contributions of Hargobind Khorana. | ICT Enabled (ppt & images, charts, video clippings) | |
| 11 | Protein synthesis-Transcription (Prokaryotic & eukaryotic) | ICT Enabled (ppt & images, charts, video clippings) | |
| 12 | Protein synthesis-Transcription (Prokaryotic & eukaryotic) | ICT Enabled (ppt & images, charts, video clippings) | |

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| 13 | Reverse transcription, post transcriptional modifications, | ICT Enabled (ppt & images, video clippings) | |
| 14 | CIA- II | 2hrs | |
| 15 | Translation, | ICT Enabled (ppt, images, animations & video clippings) | |
| 16 | Translation contd... | | |
| 17 | Post translational modifications. | | |
| 18 | Revision and Evaluation of course | | |

Additional Reading List

1. Veer BalaRastogi. (2008). *Fundamentals of Molecular Biology*, Ane's Books, India Chapter 15, pp343--378.
2. De- Robertis E.D. and De Robertis Jr.E.M.F (2002) *Cell and Molecular Biology* (Lea &Febiger/Info-Med)
3. Karp G. (1996) *Cell and Molecular Biology: Concepts and Experiments* John Wiley and Sons m, New York

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|---------------------------------|--|-----------------|----------|
| PROGRAMME | B.Sc. Zoology | SEMESTER | 5 |
| COURSE TITLE | CORE COURSE 6--ENVIRONMENTAL BIOLOGY, TOXICOLOGY AND DISASTER MANAGEMENT | CREDIT | 3 |
| HOURS/SEM | 54 | | |
| OBJECTIVES OF THE COURSE | <ul style="list-style-type: none"> • To impart basic knowledge on ecosystems and their functioning • To learn about various types of anthropogenic pressures on ecosystem, related degradation and management measures • To generate awareness on the fragility of indigenous ecosystem in which we live. | | |

| Course Plan for Course Teacher 1 (36 Hours) | | | |
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| Term – I (Before I Internal Exams) – 30 % of the syllabus | | | |
| Sessions | Topic/Module | Method of teaching * | Remarks: Books, reference <i>etc.</i> |
| 1 | Introductory Session – Ecosystems- Concept, classification | Lecture and interactions through general questions on Environment and development | Definition of Ecosystem Components of ecosystem Functions of ecosystem |
| 2 | Freshwater ecosystem Physico-chemical nature (Brief description only) Types Lentic Lotic | | |
| 3 | Freshwater ecosystem adaptations | Lecture with Power point presentation | |
| 4 | Adaptations of lentic water animals | Lecture with Power point presentation | |
| 5 | Adaptations of lotic water animals | Lecture with Power point presentation | |
| 6 | Ground water | Lecture and videos | |

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| 7 | Watershed management | Lecture with Power Point Presentation | Types of watersheds Management strategies |
| 8 | Watershed management | Lecture with Power Point Presentation | Land management Water management Biomass anagement |
| 9 | Marine ecosystem Physico chemical nature | Lecture with Power Point Presentation | Types of marine habitations |
| 10 | Intertidal zone Rocky shore Muddy shore Sandy shore | Lecture with Power Point Presentation | Adaptations of animals in different types of marine habitats |
| 11 | Coral reefs | Lecture with Power Point Presentation | Types, diversity, importance. Threats and conservation measures |
| CIA 1 | First Internal Examination | | 20 marks |
| | Term II | | |
| 12 | Open sea Pelagic realm Benthic realm | Lecture with Power Point Presentation | Animals and their adaptations |
| 13 | Estuaries-Characteristics and Importance Adaptations of animals living in estuarine habitats | Lecture with Power Point Presentation | |
| 14 | Wetlands and mangroves | Lecture with Power Point Presentation | Importance of wetlands and mangroves |
| 15 | Convention on wetlands (Ramsar, 1971) Ramsar mission | Lecture with Power Point Presentation | |
| 16 | Ramsar sites in Kerala –threats and conservation aspects | Lecture with Power Point Presentation | Locations, extend and diversity |
| 17 | Terrestrial ecosystem Abiotic/ biotic components (Brief description only) Interactions Classification (Types) | Lecture with Power Point Presentation | |

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| 18 | Biomes Forest Desert | Lecture with Power Point Presentation | Significance of climatic factors |
| 19 | Grassland Tundra | Lecture with Power Point Presentation | Adaptations of animals |
| 20 | Causes of land degradation with special reference to Kerala | Lecture with photographs and videos | |
| 21 | Discussions on landscape changes and their socio-economic basis | | |
| 22 | Module III – Man and Environment Natural resources Introduction (concept) | Lecture with Power Point Presentation | |
| 23 | Energy resources Conventional | Lecture with Power Point Presentation | |
| 24 | Non conventional energy resources | Lecture with Power Point Presentation | |
| 25 | Inexhaustible resources | Lecture with Power Point Presentation | |
| 26 | Energy conservation measures | Interactive session | |
| 27 | Assignments | Guidelines | |
| CIA II | Second Internal Examination | | 2 hour test |
| 28 | Module IV – Global environmental changes Uniqueness of the earth | Lecture with Power Point Presentation | |
| 29 | Global warming | Lecture with Power Point Presentation | Impact on human civilization |
| 30 | Green house effect | Lecture with Power Point Presentation | |
| 31 | Ozone layer formation and depletion | Lecture with Power Point Presentation | |

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| 32 | Climate change (Brief description only) Definition- recent developments | Lecture with Power Point Presentation | Impact on ecosystems |
| 33 | Kyoto protocol IPCC/UNFCC Emission reduction | Lecture with Power Point Presentation | Legal aspects |
| 34 | Carbon credit Carbon trading | Lecture with Power Point Presentation | Economic aspects |
| 35 | Carbon sequestration | Lecture with Power Point Presentation | Methods for carbon dioxide capturing |
| 36 | Module V – Local environmental issues Landscape changes in Kerala Impact of tourism on ecology with special reference to aquatic ecosystems | Lecture with Power Point Presentation | Urbanization, Industrialization Agricultural degradation |

Course Plan for Course Teacher 2 (18 Hours)

| Sessions | Topic | Method | Remarks |
|----------|---|--|---------|
| | Module I – Introduction | | |
| 1 | History, development Scope, branches | ICT Enabled (ppt&images, video clippings) | |
| | Module V – Municipal Solid Waste | | |
| 2 | Plastic pollution Types of plastics Problems of plastics Management Strategies | ICT Enabled (ppt&images, charts, video clippings) | |
| 3 | Biowastes and their management. – aerobic and anaerobic systems. | ICT Enabled (ppt&images, video clippings) | |
| 4 | e-waste: Major types and sources - Toxic ingredients - Effects on environment and human health Management strategies | ICT Enabled (ppt& animations, images, video clippings) | |
| | Module V – Local environmental issues | | |

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| 5 | Impact of tourism on ecology | ICT Enabled (ppt&images, video clippings) | |
| 6 | Landscape changes | ICT Enabled (ppt&images, video clippings) | |
| 7 | CIA I | | 1 hr; descriptive answers only |
| | Module VI – Disaster Management | | |
| 8 | Definition, Classification- Natural, Anthropogenic, Hybrid. | ICT Enabled (ppt&images, video clippings) | |
| 9 | Earthquake, Landslide, Flood, Drought | ICT Enabled (ppt&images, video clippings) | |
| 10 | Cyclone, Tsunami -Mitigation measures. | ICT Enabled (ppt&images, charts, video clippings) | |
| | Module VII: Toxicology | | |
| 11 | Definition, History of toxicology, Classification – occurrence/ source | ICT Enabled (ppt&images, video clippings) | |
| 12 | Role of toxicology | ICT Enabled (ppt, images, animations & video clippings) | |
| 13 | Toxicants of biological origin - Afflatxin, Botulinum toxin | ICT Enabled (ppt&images, charts, video clippings) | |
| 14 | CIA- II | 2 hrs | |
| 15 | Heavy metal toxicants | ICT Enabled (ppt&images, video clippings) | |
| 16 | Food additives | ICT Enabled (ppt&images, video clippings) | |
| 17 | Revision | | |
| 18 | Evaluation of the course | | |

Basic Reference

***Environmental Biology and Ethology(2002)*. Zoological Society of Kerala Study material. Published by Zoological Society of Kerala.**

Additional Reading List

1. Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders College Publishing, Philadelphia.
2. Pandey Kamleshwar, J.P. Shukla and S.P. Trivedi. 2005. *Fundamentals of Toxicology*. New Central Book Agency (P) Ltd. Kolkata, India

COURSE PLAN
U5CRZOO07: EVOLUTION, ZOOGEOGRAPHY AND ETHOLOGY

COURSE OBJECTIVES

- To acquire knowledge about the evolutionary history of earth (living and non living)
- To learn various tools and techniques for evolutionary studies
- 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

Basic Reference

1. Andrews. M.I and Joy, K.P. 2003. *Environmental biology, evolution, ethology and Zoogeography*. St.Mary's press and book dept
2. Mani, M.S. 1974.*Ecology and Biogeography of India*. Dr. W. Junk b..v. Publishers , The Hague.
3. Nair, C.S.1991. *The Southern Western Ghats : A Biodiversity Conservation Plan*. INTACH, New Delhi.
4. Ramesh,B.R and Rajan Gurukkal., 2007.*Forest Landscapes of the Southern Western Ghats, India Biodiversity, Human Ecology and management Strategies*. French Institute of Pondicherry, India.
5. Tiwari, S. 1985. *Readings in Indian Zoogeography*
6. Wilson, E.O. 1975. *Sociobiology*. Harvard University Press, Cambridge, Mass. USA.
7. Zoological Society of Kerala Study material. 2002. *Environmental Biology and Ethology* Published by Zoological Society of Kerala (Module 6, 7, 8 & 9)

Faculty 1

| Sessions | Topic | Method | Remarks |
|----------|---|--------------------------|---------|
| 1 | Module I – Origin of life Introduction | Lecture | |
| 2 | Origin of universe | Lecture with interaction | |
| 3 | Chemical evolution | Lecture | |
| 4 | Miller-Urey experiment | Lecture and interaction | |
| 5 | Haldane and Oparin theory | Lecture | |
| 6 | Module II – Theories of organic evolution Lamarckism | Lecture | |
| 7 | Critical analysis of Lamarck's propositions , Weisman's germplasm theory | Lecture | |
| 8 | Mutation theory. | Lecture | |
| 9 | Darwinism | Lecture | |
| 10 | Critical analysis of Darwinism | Lecture | |
| 11 | Modern Synthetic theory(Neo Darwinism) | Lecture | |
| 12 | Neutral theory of molecular evolution | Lecture and interaction | |
| 13 | Module III – Population genetics and evolution Genetic basis of variation | Lecture | |
| 14 | Continue | „ | |
| 15 | Hardy Weinberg equilibrium | Lecture | |
| 16 | Continue | Lecture | |
| 17 | Change in gene frequencies Factors affecting gene frequencies (brief account only) | Lecture | |
| 18 | Continue | „ | |
| 19 | Module IV – Evolution above species level Adaptive radiation | Lecture | |

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| 20 | Microevolution | Lecture | |
| 21 | Macroevolution | Lecture | |
| 22 | Evolution of horse | Lecture with ppt | |
| 23 | Continue | „ | |
| 24 | Mega evolution | Lecture | |
| 25 | Punctuated equilibrium | Lecture | |
| 26 | Speciation -Phyletic and True-Sympatric and Allopatric | Lecture | |
| 27 | Module V – Geological time scale Geological dating with radioactive elements | Lecture | |
| 28 | Continue | „ | |
| 29 | Mass extinction | Lecture | |
| 30 | Continue | „ | |
| | PART II – ZOOGEOGRAPHY AND ETHOLOGY Module VII – Animal distribution | | |
| 31 | Types and means of animal distribution | Lecture | |
| 32 | Continue | „ | |
| 33 | Barriers in animal distribution. | Lecture | |
| 34 | Continue | „ | |
| 35 | Revision of Evolution Module I,II,III | Asking questions and Clearing doubts | |
| 36 | Revision of Evolution Module IV,V,& Zoogeography module VII | „ | |

Faculty II

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| 1 | Zoogeography: Introduction; Origin of oceans and continents; Plate tectonics – continental drift | ICT Enabled (ppt & animations, video clippings) | |
| 2 | Zoogeographical realms | ICT Enabled (ppt, maps, images & video clippings) | |
| 3 | Zoogeographical realms contd... | ICT Enabled (ppt, maps, images & video clippings) | |
| 4 | Insular fauna-Continental Islands & Oceanic Islands | ICT Enabled (ppt, maps, images & video clippings) | |
| 5 | Biogeography of India – with special reference to Western Ghats | ICT Enabled (ppt, maps, images & video clippings) | |
| 6 | CIA - I | 1 hr; descriptive answers only | |
| Module VIII – Ethology | | | |
| 7 | Ethology: Definition; History and scope of ethology | ICT Enabled (ppt & video clippings) | |
| Module IX – Learning and imprinting | | | |
| 8 | Types of learning: Habituation, sensitization | ICT Enabled (ppt, animations & video clippings) | |
| 9 | Types of learning: Classical conditioning | ICT Enabled (ppt, animations & video clippings) | |
| 10 | Types of learning: Operant conditioning | ICT Enabled (ppt, animations & video clippings) | |
| 11 | Types of learning: Taste aversion; Latent learning | ICT Enabled (ppt, animations & video clippings) | |
| 12 | Types of learning: Insight Learning; Learning set learning | ICT Enabled (ppt, animations & video clippings) | |
| 13 | Imprinting; experiments by K. Lorenz | ICT Enabled (ppt, animations & video clippings) | |

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| 14 | CIA- II | 2 hrs | |
| Module X – Ethology of man | | | |
| 15 | Discussion on CIA-II; Ethology of man - Sociobiology and evolution of human behaviour | ICT Enabled (ppt, images & video clippings) | |
| 16 | Primates and human socio groups | ICT Enabled (ppt & images, video clippings) | |
| 17 | Human pheromones; Revision | ICT Enabled (ppt & images, video clippings) | |
| 18 | Revision & Evaluation of the course | | |

Additional Reading List

- Barnes, C.W. 1988. *Earth, Time and Life*. John Wiley & Sons, New York.
- Bendall, D. S. (ed.) 1983. *Evolution from Molecules to Man*. Cambridge University Press, U.K.
- Bonner, J.T. 1980. *The Evolution of Culture in Animals*. Princeton University Press, NJ, USA.
- Briggs, J.C. 1996. *Global Biogeography*. Elsevier Publishers.
- Bull J.J and H.A. Wichman. 2001. Applied Evolution. *Annu. Rev. Ecol. Syst.* 32:183-217 (Visit the Annual Reviews home page at www.AnnulReviews.org.)
- Chandran, Subash M .D. 1997. On the ecological history of the Western Ghats. *Current Science*, Vol.73, No.2.146-155.
- Chattopadhyay Sajib. 2002. *Life Origin, Evolution and Adaptation*. Books and Allied (P) Ltd. Kolkata, India.
- Chundamannil, Mammen. 1993. *History of Forest management in Kerala*. Report number 89. Kerala Forest Research Institute, Peechi, India.
- Daniels, R.J.R and J.Vencatesan .2008. *Western Ghats Biodiversity. People. Conservation*. Rupa & Co. New Delhi, India
- David McFarland. 1999. *Animal Behaviour*. Pearson Education Ltd . Essex, England.
(Module 8 and 9)
- Dawkins, M.S. 1995. *Unravelling Animal Behaviour*. Harlow: Longman.
- Dunbar, R. 1988. *Primate Social Systems*. Croom Helm, London.

- Goodwin,B. 1996. *How the Leopard Changed its Spots: The Evolution of Complexity*. Simon &Schuster, NY,USA.
- Jerry A.Coyne and H.Allen Orr.2004. *Speciation*. Sinauer Associates
- Manning Aubrey and Marian Stamp Dawkins 1998. *An Introduction to Animal Behaviour*.Cambridge University Press,UK.
- Paul W. Sherman and John Alcock.,2001 Exploring Animal Behaviour- Readings from American Scientist 3rd Edn. Sinauer Associates Inc. MA,USA.
- Rob Desalle and Ian Tattersall 2008.*Human Origins: What Bones and Genomes Tell Us about Ourselves*. Texas A&M University Press, USA.
- Sean B. Carroll and David M. Kingsley .2005 *Evolution: Constant Change and Common Threads*. Holiday Hrs on Science. Webcast or DVD available at www.hhmi.org/biointeractive/evolution.
- Strickberger, M.W.2000. *Evolution*. Jones and Bartlett, Boston.
- Thomas A P (Editor) 2011 Evolution, Zoogeography and Ethology. Green leaf publications TIES Kottayam.
- Wilson, E.O. 1975. Sociobiology. Harvard University Press, Cambridge, Mass. USA.

COURSE PLAN
BIOCHEMISTRY, HUMAN PHYSIOLOGY AND ENDOCRINOLOGY

COURSE OBJECTIVES:

1. This course will provide students with a deep knowledge in biochemistry, physiology and endocrinology.
2. Defining and explaining the basic principles of biochemistry useful for biological studies for illustrating different kinds of food, their structure, function and metabolism.
3. Explaining various aspects of physiological activities of animals with special reference to humans.
4. Students will acquire a broad understanding of the hormonal regulation of physiological processes in invertebrates and vertebrates.

Basic Reference:

Guyton 2002: Text Book of Medical Physiology Saunders pp.718-833

Prosser & Brown 2006: Comparative Animal Physiology

Zoological Society of Kerala, Study material 2002. *Biochemistry, Physiology and Endocrinology* Published by Zoological Society of Kerala

Harper's Illustrated Biochemistry, 27th Ed, Mc Graw Hill

Teacher 1

| Session | Topic | Method | Remarks |
|---------|---|-------------------------------------|---------|
| | Part I. BIOCHEMISTRY | | |
| | Module 1 - GENERAL BIOCHEMISTRY, BIOELEMENTS AND BIOMOLECULES | | |
| 1. | Introduction To Biomolecules | Discussion and lecture | |
| 2. | Carbohydrates- structure of basic compounds, classifications with examples and its biological importance. | Lecture | |
| 3. | Protein–classifications and its biological importance. | Lecture | |
| 4. | Protein– structure, | Lecture and powerpoint presentation | |
| 5. | Lipids–structure classifications with examples and its biological importance | Lecture | |
| | Module -2 METABOLISM | | |
| 6 | Carbohydrate metabolism- Glycolysis | Lecture and powerpoint presentation | |
| 7 | Citric acid cycle | | |
| 8 | ATP synthesis | | |
| 9 | Glycogenesis, glycogenolysis, | Lecture and powerpoint presentation | |
| 10 | Gluconeogenesis , HMP shunt | Lecture and powerpoint presentation | |
| 11 | Lipid metabolism- Biosynthesis | Lecture and powerpoint presentation | |
| 12 | Oxidation of fatty acids- Beta oxidation, | Lecture and powerpoint presentation | |
| 13 | Physiologically important compounds synthesized from cholesterol | Lecture and powerpoint presentation | |

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| 14 | Protein metabolism- Deamination, transamination, transmethylation, decarboxylation, | Lecture and powerpoint presentation | |
| 15 | Ornithine cycle | Lecture | |
| | Module 3- ENZYMES | | |
| 16 | Chemical nature of enzymes, | Lecture and powerpoint presentation | |
| 17 | Mechanism of enzyme action, | Lecture and powerpoint presentation | |
| 18 | Factors influencing enzyme action | Lecture and powerpoint presentation | |
| 19 | Enzyme activation, enzyme inhibition, allosteric enzyme, isoenzymes, co-enzyme | Lecture and powerpoint presentation | |

Teacher : 2

| Session | Topic | Method | Remarks |
|---------|---|-------------------------------------|---------|
| 1 | Food adulteration | Lecture and PowerPoint presentation | |
| 2 | Defects of modern food habits | Lecture and PowerPoint presentation | |
| 3 | Importance of fibers in food | Lecture and PowerPoint presentation | |
| 4 | Weight control | Lecture and PowerPoint presentation | |
| 5 | Nutrition during pregnancy, breast feeding | Lecture and PowerPoint presentation | |
| 6 | Anorexia, acidity and ulcers, flatulence, fasting and its significance | Lecture and PowerPoint presentation | |
| 7 | Malfunctions of gastro intestinal tract | Lecture and PowerPoint presentation | |
| 8 | Gas transport, Factors affecting transport of respiratory gases through blood | Lecture and PowerPoint presentation | |
| 9 | Oxy-hemoglobin curve, Bohr effect, | Lecture and PowerPoint presentation | |

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| | reverse Bohr effect, Haldane effect | | |
| 10 | Neural (voluntary and automatic) and chemical control (mention the role of carotid and aortic bodies) of respiration | Lecture and PowerPoint presentation | |
| 11 | Smoking and its physiological effects, carbon monoxide poisoning, oxygen toxicity, nitrogen narcosis, dysbarism, oxygen therapy | Lecture and PowerPoint presentation | |
| 12 | Artificial respiration, respiratory disorders – hypoxia, hypocapnia, hypercapnia, asphyxia | Lecture and PowerPoint presentation | |
| 13 | Cerebral circulation, blood brain barrier and cerebrospinal fluid | Lecture and PowerPoint presentation | |
| 14 | Haemo dynamic principles, formation and fate of blood cells | Lecture and PowerPoint presentation | |
| 15 | Blood composition ,blood clotting mechanism – intrinsic and extrinsic pathways, clotting factors, anticoagulants | Lecture and PowerPoint presentation | |
| 16 | Blood transfusion, safety and security problems, heamostasis | Lecture and PowerPoint presentation | |
| 17 | Haemolysis, jaundice, thrombosis, ESR. | Lecture and PowerPoint presentation | |
| 18 | Urea cycle (in detail), renal handling of individual substances | Lecture and PowerPoint presentation | |

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| | eg. glucose, sodium, urea, water | | |
| 19 | Factors affecting GFR, concept of plasma clearance, acid base balance | Lecture and PowerPoint presentation | |
| 20 | Kidney disorders – acute renal failure, chronic renal failure-glomerular nephritis | Lecture and PowerPoint presentation | |
| 21 | Pyelonephritis, nephrotic syndrome and kidney stones | Lecture and PowerPoint presentation | |

Teacher : 3

| Sessions | Topic | Method | Remarks/Reference |
|----------|---|---|-------------------|
| | Module VIII. MUSCLE PHYSIOLOGY | | |
| 1 | Ultra structure of striated muscle. Mechanism of muscle contraction. | ICT Enabled (ppt & images, video clippings) | |
| 2 | Biochemistry of muscle contraction, isotonic and isometric contraction. | ICT Enabled (ppt & images, charts, video clippings) | |
| 3 | Electrical, chemical and morphological changes and ionic fluxes during contraction of striated muscle fibre, Cori cycle, electrophysiology of muscle, threshold and spike potentials, simple muscle twitch, whole muscle contraction, isotonic and isometric contraction, latent and refractory periods, summation, beneficial effect, superposition curve, tetanus, tonus, staircase phenomenon, fatigue, oxygen debt, rigor mortis. | ICT Enabled (ppt & images, video clippings) | |
| | Module 9 NEUROPHYSIOLOGY | | |

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| 4 | Synaptic transmission & properties of synapses, | ICT Enabled (ppt & images, video clippings) | |
| 5 | neurotransmitters, role of dopamine and serotonin. | ICT Enabled (ppt & images, video clippings) | |
| 6 | EEG, memory, short term and long term sleep, dream, | ICT Enabled (ppt & images, video clippings) | |
| 7 | Neural disorders- dyslexia, Parkinson's disease, epilepsy, Alzheimer's disease, schizophrenia. | ICT Enabled (ppt & images, video clippings) | |
| | Module 10 -SPORTS PHYSIOLOGY | | |
| 8 | Muscular, Respiratory and cardiovascular changes during exercise, dope test, drug abuse. | ICT Enabled (ppt & images, video clippings) | |
| 9 | Significance of exercise in body fitness. | ICT Enabled (ppt & images, video clippings) | |
| | Module 11:ENDOCRINOLOGY | | |
| 10 | Hormones as messengers, classification and types of hormones | ICT Enabled (ppt & images, charts, video clippings) | |
| 11 | General principles of hormone action, | ICT Enabled (ppt & images, video clippings) | |
| 12 | Concept of hormone receptors, | ICT Enabled (ppt, images, animations & video clippings) | |
| 13 | hormonal control of homeostasis | ICT Enabled (ppt & images, charts, video clippings) | |
| 14 | CIA- II | 2 hrs | |
| 15 | Secretion, Regulation, Functions and Disorders of hormones of Hypothalamus, Hypophysis, | ICT Enabled (ppt & images, video clippings) | |
| 16 | Secretion, Regulation, Functions and Disorders of hormones of Pineal, Thyroid, Parathyroid, | ICT Enabled (ppt & images, charts, video clippings) | |
| 17 | Secretion, Regulation, Functions and Disorders of hormones of Thymus, | ICT Enabled (ppt & images, video clippings) | |

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| | Islets of Langerhans, Adrenal, Gonads, Placenta, Gastro intestinal hormones. | | |
| 18 | Revision & Evaluation of the course | | |

Additional Reading List

- Barrington, E.J.W. General and Comparative Endocrinology, Oxford, Clarendon Press.
- Bentley, P.J. Comparative Vertebrate Endocrinology, Cambridge University Press.
- Young J.Z. 1981. The life of Vertebrates (Oxford University Press).

OPEN COURSE FOR OTHER STREAMS

HUMAN GENETICS, NUTRITION, COMMUNITY HEALTH AND SANITATION

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 plays in the life of all organisms.
- To introduce the student to some of the present and future applications of bio-sciences

Core Readings

Zoological Society of Kerala Study Material Series 2002

Cell biology Genetics & Biotechnology published by Zoological Society of Kerala.

K Park, (2008) Park's Text Book of Preventive and Social

TEACHER 1: 18 HRS

| Sessions | Topic | Method | Remarks/Reference |
|----------|---|-----------------|-------------------|
| | Part- I HUMAN GENETICS | | |
| | Module I | | |
| 1. | Human normal chromosome complement | Lecture and ppt | |
| 2. | Chromosomal anomalies | Lecture | |
| 3. | Down Syndrome and Cri du chat syndrome | Lecture and ppt | |
| 4. | Sex chromosomal anomalies – Syndromes- Klinefelters Syndrome and Turners Syndrome | Lecture and ppt | |
| 5. | Genetic disorders in man. Single gene mutation disorders- Eg. Sickle Cell anaemia | Lecture and ppt | |
| 6. | Polygenic disorders – Cleft lip and palate | Lecture and ppt | |
| 7. | Sex linked inheritance – Haemophilia and Colour blindness | Lecture and ppt | |
| | CIA I | 1 hr | |

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| 8. | Pre – natal Diagnosis - Significance | Lecture | |
| 9. | Amniocentesis, Chorionic Villus Sampling, Ultra sound scanning and Fetoscopy | Lecture and ppt | |
| 10. | Genetic Counselling. Eugenics and Euthenics | Lecture | |
| | Module II | | |
| 11 | Human blood groups and their inheritance pattern | Lecture and black board | |
| 12. | Blood transfusion – Universal Donor, Universal recipient – Importance of Blood donation | Lecture and ppt | |
| 13. | DNA finger printing and applications – Probing for criminals – Method to resolve paternity and maternity disputes | Lecture and ppt | |
| 14. | Human Reproductive system | Lecture and ppt | |
| 15. | Causes of human infertility – a brief account | Lecture and ppt | |
| | CIA II | 2 hrs | |
| 16. | Human genome project – a brief account | Lecture | |

TEACHER 2: 18 HRS

| Sessions | Topic | Method | Remarks/Reference |
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| 1 | PART – II NUTRITION AND COMMUNITY HEALTH | Lecture | |
| | Module III | | |
| 2 | Definition and meaning of health. Dimensions of health, physical activity and health benefits | Lecture | |

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| 3 | Effect of exercise on body systems – Circulatory and Respiratory | Lecture | |
| 4 | Effect of exercise on body systems – Endocrine and Skeletal | Lecture | |
| 5 | Effect of exercise on body systems – Muscular | Lecture | |
| 6 | Programmes on Community health promotion – individual and family | Lecture | |
| 7 | Programmes on Community health promotion – Society | Lecture | |
| 8 | Dangers of alcoholic and drug abuse, medico legal implications. | Lecture and ppt | |
| | CIA -I | 1 hr. | |
| | Module IV | | |
| 9 | Introduction to concept of food and nutrition. | Lecture | |
| 10 | Balanced diet. | Lecture | |
| 11 | Vitamins and malnutrition | Lecture and ppt | |
| 12 | Deficiency diseases | Lecture and ppt | |
| 13 | Determining of caloric intake and expenditure | Lecture | |
| 14 | Obesity causes and preventive measures | Lecture | |
| 15 | Role of diet and exercise. BMI | Lecture | |
| | Module V | | |
| 16 | Introduction to safety education | Lecture | |
| 17 | Principles of accident prevention | Lecture | |
| 18 | Health and safety in daily life and at work | Lecture | |
| 19 | First aid and emergency care | Lecture and ppt | |

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| 20 | Modern lifestyle and hypokinetic diseases- Prevention and Management | Lecture and ppt | |
| | Module VI | | |
| 21 | Introduction to life skill education | Lecture | |
| 22 | Physical activity, emotional adjustment and well being | Lecture | |
| | CIA II | 2 hrs | |
| 23 | Yoga, meditation and relaxation | Lecture and ppt | |
| 24 | Psychoneuroimmunology | Lecture | |

TEACHER 3: 36 HRS

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| | PART III. COMMUNITY HEALTH AND SANITATION | |
| | Module VII | |
| 1. | Potable water quality monitoring and waste water management. | ICT Enabled (ppt & animations, images, video clippings); discussion |
| 2 | Potable water quality monitoring and waste water management. Contd.. | |
| 3 | Determination of sanitary quality of drinking water | ICT Enabled (ppt & animations, images, video clippings); discussion |
| 4 | Water purification techniques. | ICT Enabled (ppt & animations, images, video clippings); discussion |
| 5 | Water purification techniques.Contd... | |
| 6 | Water purification techniques Contd... | |
| 7 | Faecal bacteriae and pathogenic microorganisms transmitted by water. | ICT Enabled (ppt & animations, images, video clippings); discussion |
| 8 | Faecal bacteriae and pathogenic microorganisms transmitted by water.Contd... | |
| 9 | Cholera and Typhoid. | ICT Enabled (ppt & animations, images, video clippings); discussion |
| 10 | Cholera and Typhoid. contd... | |

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| 11 | Vermicomposting a method of solid waste management | ICT Enabled (ppt & animations, images, video clippings); discussion |
| | Module VIII | |
| 12 | Public Health and Food borne diseases | ICT Enabled (ppt & animations, images, video clippings); discussion |
| 13 | Public Health and Food borne diseases contd... | |
| 14 | Food Poisoning causes and prevention | ICT Enabled (ppt & animations, images, video clippings); discussion |
| | CIA I | 1 hr |
| 15 | Food poisoning caused by toxins produced by microbes eg Staphylococcal food poisoning, | |
| 16 | Botulism, Salmonellosis | ICT Enabled (ppt & animations, images, video clippings); discussion |
| 17 | Botulism, Salmonellosis contd... | |
| 18 | CIA II | 2hrs |
| 19 | Food infection caused by growth of microorganisms in the human body after the contaminated food has been eaten. | ICT Enabled (ppt & animations, images, video clippings); discussion |
| 20 | E Food Infection hepatitis (hepatitis A) | ICT Enabled (ppt & animations, images, video clippings); discussion |
| 21 | Food Infection hepatitis (hepatitis A). Contd... | ICT Enabled (ppt & animations, images, video clippings); discussion |
| 22 | Waterborne diseases and food borne diseases :Revision | ICT Enabled (ppt & animations, images, video clippings); discussion |
| | Module IX | |
| 23 | Emerging pathogens and diseases – Introduction | Lecture and PPT |
| 24 | Emerging pathogens and diseases – Swine flue (H1N1), bird flue (H5N1) | Lecture and PPT |
| 25 | Emerging pathogens and diseases –SARS, Anthrax | Lecture and PPT |
| 26 | Reemerging pathogens and diseases – TB | Lecture and PPT |

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| 27 | Vector borne diseases (mosquito) and their control measures Mosquito eradication | Lecture and PPT |
| 28 | Vector borne diseases mosquito- Chikungunya , Malaria | Lecture and PPT |
| 29 | Vector borne diseases mosquito- Filariasis and Dengu fever | Lecture and PPT |
| 30 | Leptospirosis and preventive measures – Rodent control measures | Lecture and PPT |
| | CIA II | 2 hrs |
| 31 | Cancer different types | Lecture and PPT |
| 32 | Causes of cancer, carcinogens, diet & cancer | Lecture and PPT |
| 33 | (e) HIV, AIDS – causes & preventive measures | Lecture and PPT |
| 34 – 36 | Revision | |

Selected Further Readings

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 Counties 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