SACRED HEART COLLEGE (AUTONOMOUS)

DEPARTMENT OF ZOOLOGY

BACHELOR OF SCIENCE IN ZOOLOGY

Course plan

Academic Year 2014 – 15

Semester 6

COURSE PLAN

DEVELOPMENTAL BIOLOGY

OBJECTIVES OF THE COURSE

1. To develop critical thinking skill and research aptitude among students, by introducing the frontier areas of the biological science.
2. To emphasize the central role that biological sciences plays in the life of all organisms.
3. To introduce the student to the process of embryonic development of organisms.

Sessions	Topic	Method
3	Introductory Session - Scope of developmental biology, definition, sub-divisions, Early history of embryology.	Lecture, introductory general questions on Developmental Biology
3	Human reproductive organs and gametogenesis significance.	Lecture, Power point presentation
3	Egg types **-** Classification of eggs, based on the amount, distribution and position of yolk. Influence of yolk on development.	Power point presentation
3	Mosaic, regulative and cleidoic eggs, Polarity, symmetry and egg content.	Power point presentation
1	**Giving assignment topics**	
3	Sexual cycle - Estrus cycle (non-primate) and menstrual cycle (primate cycle). Hormonal control of menstrual cycle.	Power point presentation
3	Fertilization- Approach and binding of spermatozoa, activation of the egg, amphimixis.	Power point presentation
3	Parthenogenesis-natural and artificial, Arrhenotoky, Thelytoky, Obligatory and Facultative	Lecture, Interactive discussion
3	Cleavage - Types, planes of cleavage, Cell lineage, Holoblastic and Meroblastic cleavage, Patterns of cleavage, Influence of yolk on cleavage.	Lecture, Power point presentation
1	**CIA – I**	1 hr; class test short & descriptive answers only
3	Blastulation - Blastula formation, Types of blastula	Lecture, Power point presentation

3	Fate maps- Concept of fate maps, construction of fate maps. A typical vertebrate fate maps. Significance of fate map.	Lecture, Power point presentation
3	Gastrulation - Definition, Morphogenetic cell movements, Epiboly, Emboly, Concept of germ layers and its derivatives.	Lecture, Presentation with clippings
1	**Submission of assignments**	
3	Cell differentiation and gene action - Totipotency, Pleuripotency, Unipotency of embryonic cells. Determination and differentiation in embryonic development, Gene action, control of gene expression.	Lecture, Interactive discussion
3	Embryology of Frog – Gametes, fertilization, cleavage, blastulation, gastrulation, neurulation	Lecture, Power point presentation
3	Embryology of Frog – organogenesis, development of nervous system, eye, ear, metamorphosis	Lecture, Power point presentation
1	**CIA - II**	2 Hours
3	Embryology of chick - Structure of egg, fertilization, cleavage, blastulation, gastrulation.	Lecture, Power point presentation
3	Embryology of chick - 18 hour chick embryo and 24 hour chick embryo. Extra embryonic membranes in chick.	Power point presentation
2	Seminar presentation by students	Interactive discussion

References

1. Balnisky B.I 1981 An Introduction to Embryology, W.B. Saunders and Co.
2. Berril, N.J and Kars G. 1986. Developmental biology, Mc Graw Hills, New Delhi.
3. Gilbert, S.F. 2006. *Developmental Biology* (9thedn).Sinauer Associates Inc., Publishers, Masachusettes, USA
4. Melissa A – Gibbs, A practical Guide to Developmental Biology, Oxford university press (Int. student edition) 2006
5. Pattern M.B. and Carlson B.C. 1974 Foundations of Embryology, TMH, New Delhi.
6. Vijayakumarn Nair K.and P. V George. A manual of developmental biology, Continental publications , Trivandrum
7. Zoological Society of Kerala, Study material 2002. *Biochemistry, Physiology and Developmental Biology* Published by Zoological Society of Kerala

COURSE PLAN
GENETICS AND BIOTECHNOLOGY

COURSE OBJECTIVES

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

Basic Reference

- Cell Biology, Genetics and Biotechnology. (2002). Zoological Society of Kerala Study Material Series. Published by Zoological Society of Kerala.
- Gardner, E. J. and Snustad, D. P. (1984). Principles of Genetics (John Wiley and Sons), New York.

TEACHER I			
Sessions	**Topic**	**Method**	**Remarks/Reference**
1	**Module I** 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,	Lecture	
2	Mendelism – Mendel's laws ,Mendelian traits in man Chromosome theory of heredity.	Lecture with interaction	
3	**Module II** **Interaction of genes:** Allelic and non Allelic. Allelic- incomplete dominance and Co-dominance	Lecture	
4	Non allelic interactions, – complementary, supplementary, epistasis – dominant (feather colour in fowl) and recessive (coat colour in mice) Polygenes (Skin colour inheritance in man)	Lecture and interaction	
5	Pleiotropism, modifying genes, lethal genes (Brief account with one example each)	Lecture	
6	Multiple alleles(eg) Coat Colour in rabbits. Man ABO blood group Rh factor	Lecture	
7	Blood group and its inheritance . Revision of Module II.	Lecture	
8	**Module III**	Lecture	

	Linkage and recombination of genes based on Morgan's work in Drosophila (Complete and incomplete linkage) .		
9	Linkage map	Lecture	
10	Chromosome mapping	Lecture	
11	**Module IV** Sex determination: Chromosome theory of sex determination (sex chromosomes and autosomes) chromosomal mechanism (XX-XO, XX-XY, ZW-ZZ)	Lecture	
12	Barr bodies and Lyon hypotheses : Sex determination in man- role of Y chromosome. Sex determination in honey bees. Genic balance theory.	Lecture and interaction	
13	Drosophila- intersex, gynandromorphs. Hormonal Influence on sex determination Environmental influence - Hermaphroditism	Lecture	
14	**Module V** Mutations, Types of Mutations.		
15	Germinal, Sex linked mutations	Lecture	
16	Chromosomal mutations - structural and numerical changes.	Lecture and ppt	
17	**Gene mutation (point mutation) Molecular basis of gene mutations – tautomerism-** Induced mutations Physical and chemical mutagens	Lecture	
18	Revision of Module V &VI	Questions &doubt clearing	
TEACHER II			
1	Extra nuclear inheritance, Mitochondrial and plastid DNA	Lecture	
2	Kappa particles in Parmecium	Lecture	
3	Bacterial genetics - Recombination, Transformation,	Lecture and ppt	
4	Transduction, Conjugation, F mediated sex duction, Resistance transfer factor (RTF)	Lecture and ppt	
5	Mechanism of drug resistance in bacteria, Transposable genetic elements in bacteria	Lecture and ppt	
6	Basic components and mechanisms of transposition in bacteria.	Lecture and ppt	
7	Class test – Module VI	Descriptive test	
8	Karyotyping, Pedigree analysis, Aneuploidy and non-disjunction, genetic disorders in man	Lecture and ppt	
9	Chromosomal anomalies – autosomal and sex chromosomal, single gene disorders, gene mutation and disorders	Lecture	

10	Autosomal single gene disorders, inborn errors of metabolism	Lecture and ppt	
11	Sex linked inheritance, pseudoautosomal genes, multifactorial disorders	Lecture	
12	Sex limited and sex influences traits, prenatal diagnosis, ultrasound scanning and fetoscopy	Lecture and ppt	
13	Genetic counselling, eugenics and euthenics	Lecture and ppt	
14	Class test – Module VII	Descriptive test	
15	Introduction to biotechnology and basic aspects of genetic engineering	Lecture and ppt	
16	Tools and vectors in genetic engineering	Lecture and ppt	
17	Isolation of genes/DNA, techniques of rDNA, techniques of production of rDNA	Lecture and ppt	
18	rDNA transfer, cloning and DNA mediated gene transfer	Lecture and ppt	
19	Class test – Module VIII	Descriptive test	
20	PCR and DNA amplification	Lecture and ppt	
21	Blotting techniques – Southern, Northern and Western Blotting	Lecture and ppt	
22	Identification of DNA, mRNA and Protein	Lecture and ppt	
23	DNA hybridization and DNA finger printing	Lecture and ppt	
24	RFLP markers, Gene libraries,	Lecture and ppt	
25	Construction of genomic library and cDNA library	Lecture and ppt	
26	Stem cell cultures – types and uses	Lecture and ppt	
27	Class test – Module IX and X	Descriptive test	
28	Applications of Biotechnology, SCP, Tissue culture,	Lecture and ppt	
29	Gene therapy, Stem cell therapy	Lecture and ppt	
30	Monoclonal antibodies, Hormones, Antibiotics, Vaccines	Lecture and ppt	
31	Class test – Module XI and XII	Descriptive test	
32	Agricultural biotechnology, microbial insecticides	Lecture and ppt	
33	Hazards of biotechnology, problems, patenting and patent protection	Lecture and ppt	
34	Biowar and biopiracy	Lecture and ppt	

35	Class test – Module XIII	Descriptive test	
36	Revision and Evaluation		

Additional Reading List

- Cell Biology, Genetics and Biotechnology. (2002). Zoological Society of Kerala Study Material Series. Published by Zoological Society of Kerala.
- Gardner, E. J. and Snustad, D. P. (1984). Principles of Genetics (John Wiley and Sons), New York.
- Stern, C. (1973). Human Principles of Human Genetics, W.H. Freeman and co,
- Veer Bala Rastogi. (2008). Fundamental of Molecular Biology. Ann Students Education.
- Verma, P.S. and Agarwal, V. K. (1988). Genetics. S. Chand and Co. New Delhi.

COURSE PLAN

MICROBIOLOGY AND IMMUNOLOGY

COURSE OBJECTIVES

1. To inspire the students in learning the frontier areas of biological sciences
2. To make them aware of the pathogens, health related problems, their origin and treatment.
3. To equip the students with the knowledge of immune system of our body
4. To make them aware of vaccine and their importance

Basic Reference

Microbiology and Immunology, Study Material Series published by Zoological Society of Kerala

TEACHER 1: 18 HRS

Sessions	Topic	Method	Remarks/Reference
	Module I : Microbiology		
1	Introduction and Scope of Microbiology	ICT Enabled (ppt & images, video clippings)	
2	Classification of bacteria, Fungi, Viruses	ICT Enabled (ppt & images, video clippings)	
	Module II : Methods in Microbiology		
3	Sterilisation and disinfection	ICT Enabled (ppt & images, charts, video clippings)	
4	Different methods- Physical	ICT Enabled (ppt & images, video clippings)	
5	Chemical	ICT Enabled (ppt & animations, images, video clippings)	
6	Culture media, Culture techniques	ICT Enabled (ppt & images, video clippings)	
7	Culture Preservation Techniques	ICT Enabled (ppt & images, video clippings)	
8	CIA-1	1 hr; descriptive answers only	

	Module III: Bacteria Structure		
9	Morphology and Fine structure of bacteria. Size, Shape and arrangement of Bacterial cells	ICT Enabled (ppt & images, video clippings)	
10	Anatomy-Structures External to the cell wall	ICT Enabled (ppt & images, video clippings)	
11	Cell wall	ICT Enabled (ppt, images, animations & video clippings)	
12	Structures internal to the Cell wall	ICT Enabled (ppt & images, video clippings)	
13	Spores and Cysts	ICT Enabled (ppt & images, charts, video clippings)	
	Module IV		
14	Bacterial Growth, Effect of Various factors on bacterial growth.	ICT Enabled (ppt & images, video clippings)	
15	Cell Division, Nutrition requirements; Total count, viable count, Bacterial Growth Curve.	ICT Enabled (ppt & images, video clippings)	
	Module V: Basic Virology		
16	Properties, Classification and Nomenclature of Viruses	ICT Enabled (ppt & images, video clippings)	
17	Replication of Viruses, Cultivation of Viruses	ICT Enabled (ppt & images, video clippings)	
18	Viral Assay	ICT Enabled (ppt & images, video clippings)	
	Revision & Evaluation of the course		

TEACHER 1: 36 HRS

Sessions	Topic	Method	Remarks
	Module 6: Infections		
1	Types of infections	Discussion to test the pre-requisite ICT Enabled (PPT & images)	
2	Contagious diseases	Lecture and PPT	
3	Modes of transmission of diseases	Discussion and lecture	

4	Different types of carriers	Lecture	
	Module 7: Diseases caused by different pathogens		
5	Bacterial diseases: Tuberculosis & Typhoid	Seminar (3)	
6	Viral : Infuenza & Polio	Seminar (3)	
7	Fungal:Dermatophytoses & Candidiasis	Seminar (3)	
	PART II IMMUNOLOGY **Module 8: Introduction to Immunology**		
8	Types of immunity	Testing the pre- requisite	
9	Mechanism of innate immunity	Lecture and PPT	
10	Acquired - passive & active	Lecture	
11	Vaccines types of vaccines , live, killed	Seminar (2)	
12	Vaccines- toxoids, recombinant DNA	Seminar (2)	
13	CIA- I	1 hr descriptive test	
	Module 9: Antigens Antibodies Complements		
14	Types of Antigens, haptens, antigenic determinants	Demonstration	
15	Basic structure of immunoglobulins.	ICT Enabled (PPT, images)	
16	Different classes of immunoglobulins and functions	ICT Enabled (PPT & images)	
17	Complement system, biological effects of complements	Lecture and black board use	
	Module 10: Antigen-antibody reactions		
18	Precipitation test, Agglutination Test	ICT Enabled (PPT & images)	
19	Widal , VDRL, Coombs test	ICT Enabled (PPT & images)	
20	HIV test (ELISA) Complement fixation test	ICT Enabled (PPT & images)	
	Module 11: Immune Response system		
21	Primary lymphoid organs	Lecture and PPT	
22	Secondary lymphoid organs	Lecture and PPT	
23	Lymphocytes T & B cells	Lecture and reading	
24	Macrophages, Plasma cells, Memory cells	Lecture and reading	
25	MHC Antibody synthesis	ICT Enabled (PPT & images)	
26	Primary and secondary responses	ICT Enabled (PPT & images)	
27.	Monoclonal antibodies – Hybridoma technology , uses	ICT Enabled (PPT & images)	
	Module 12: Immunopathology- immune disorders		

28	Different types of hypersensitivity reactions	Lecture	
29	Different types of hypersensitivity reactions contd.	Lecture	
30	CIA-II	2 hrs descriptive	
31	Autoimmunity, mechanisms of autoimmunization	ICT Enabled (PPT & images)	
32	Lymphadenoid goiter, thyrotoxicosis	Seminar (2)	
33	Rheumatoid arthritis and systemic lupus erythromatosis	Seminar (2)	
34	Transplantation Immunity	Lecture	
35	Immunology of blood transfusion, Erythroblastosis foetalis	Lecture	
36	Revision and Evaluation		

Additional Reading List

1. Anthanarayan R & C.K. Jayaram Panicker. Textbook of Microbiology (2008) Orient Longman
2. Private Ltd.
3. Ivan Roitt: 2002 Essentials of Immunology ELBS.
4. Michael J. Pelczar ECS,Chan & Noel. R. Kreig, Microbiology, Tata McGraw Hill 5th ed. 1996.
5. Prescott. Microbiology 2nd edition

PROGRAMME	**B.Sc. Zoology**	**SEMESTER**	**6**
COURSE TITLE	**CORE COURSE 12** **GENERAL INFORMATICS, BIOINFORMATICS, BIOSTATISTICS AND RESEARCH METHODOLOGY**	**CREDIT**	3
HOURS/SEM	54		
OBJECTIVES OF THE COURSE	1. To inspire the students in learning the frontier areas of biological sciences 2. To update and expand basic informatics skills and attitudes relevant to the emerging knowledge of society and also to equip the students to effectively utilize the digital knowledge resources in learning. 3. To equip the students with the knowledge of modern developments and recent trends in biological sciences 4. To familiarize with the basic tools and techniques of scientific study with emphasis on biological sciences		

	Teacher 1 (36 Hours)		
Sessions	**Topic**	**Method**	
	General Informatics (6 Hours) **Bioinformatics (18 Hours)** **Research Methodology (12 Hours)**		
1	**Module-1.Introduction (2 hrs)** Microprocessors RAM, ROM, EPROM, Memory systems, input, output devices.	Lecture and PowerPoint presentation	
2	Disk operating systems, Booting and formatting. Use of information technology in biological research	Lecture and PowerPoint presentation	
3	**Module-2. Operating Systems (4 hrs)** (DOS, Windows, Linux (only basics)	Lecture and PowerPoint presentation	
4	Application programs MS Office (MS word, Excel, Access and PowerPoint)	Lecture and PowerPoint presentation	
5	Computer programming, Networking (LAN, WAN), Internet, World Wide Web	Lecture and PowerPoint presentation	
6	Databases and information retrieval. New technology in Internet	Lecture and PowerPoint presentation	
	Bioinformatics (18 hrs)		

7	**Module-3 (6 hrs)** Definition, Key events in the history of Bioinformatics	Lecture and PowerPoint presentation	
8	Nature & Scope of Bioinformatics - Contrast between Bioinformatics and Computational Biology	Lecture and PowerPoint presentation	
9	Key Bio-sequences in Molecular Biology - DNA, RNA and Amino-acid sequences	Lecture and PowerPoint presentation	
10	Popular Databases in Bioinformatics - NCBI, DDBJ, PDB, OMIM	Lecture and PowerPoint presentation	
	First Internal Examination	1 hr; class test short & descriptive answers only	
11	BLAST & FASTA sequence file formats, Approach of Comparative Biology based on sequence comparison	Lecture and PowerPoint presentation	
12	The basic idea of sequence comparison algorithms (mention only) - idea of scoring matrices	Lecture and PowerPoint presentation	
13	**Module 4 (6 hrs.)** The Blast search engine - important features	Lecture and PowerPoint presentation	
14	BLAST-Important features	Lecture and PowerPoint presentation	
15	Idea of Multiple sequence alignment	Online demonstration	
16	Proteomics: Basic ideas of Protein Structure prediction	Lecture and PowerPoint presentation	
17	Concept of Homology Modeling Threading *Ab initio* method	Lecture and PowerPoint presentation	
18	Idea of Molecular Phylogenetics - advantages and computational procedure (only description of use of a package such as Phylip)	Lecture and demonstration	
	Module 5 (6 hrs.)		
19	Basic concepts of computer Aided Drug Discovery- General description of drug discovery pipeline- concept of Personalized medicine	Lecture and PowerPoint presentation	

20	Bioinformatics tools: (i) Molecular Visualization Software - Rasmol (Basic features only) - (ii) ORF finding (iii) gene finding, (iv) BLAST	Lecture and PowerPoint presentation	
21	(iv) Hydrophobicity Prediction-Methods and Applications	Lecture and PowerPoint presentation	
22	(v) Single Nucleotide Polymorphism (SNP) prediction using GENSNIP	Lecture and PowerPoint presentation	
23	**Module 6 Future Prospects: 2 hrs.** 1. Human brain Project Computer simulation and visualization of molecular structure	Lecture and PowerPoint presentation	
24	**Future Prospects: 3.** Protein function prediction.	Lecture and PowerPoint presentation	
	Research Methodology (12 Hours)		
	Module I. Tools and Techniques in Biological Research (7 hrs)		
25	Scientific drawing -Purpose and principle Basic understanding on principle and uses of Microscopy (a) Light microscopy, Bright field (Compound Microscope)	Lecture and PowerPoint presentation	
26	Phase contrast microscopy, Dark field microscopy, Fluorescence microscopy, Polarization microscopy, Video microscopy.	Lecture and PowerPoint presentation	
27	(b) Electron - Scanning (SEM), Transmission (TEM) and STEM	Lecture	
28	Micrometry – Stage and Eyepiece micrometers Camera Lucida Instrumentation - pH Meter	Lecture and PowerPoint presentation	
29	Separation Techniques - Centrifugation	Lecture and PowerPoint presentation	
30	- Chromatography - Electrophoresis	Lecture and PowerPoint presentation	

31	Analytical techniques Colorimeter Spectrophotometer X-ray crystallography	Lecture and PowerPoint presentation	
	Module II. Research Methodology (4 hrs)		
32	Scientific method Research Projects- Steps and process. Types.	Lecture and PowerPoint presentation	
33	Research Communication-Research report writing (Structure of a scientific paper) Presentation techniques	Lecture and PowerPoint presentation	
34	Project proposal writing Assignment, seminar, debate, workshop, colloquium, Conference- Brief description and major differences	Lecture and PowerPoint presentation	
35	**Module III. Units of measurements (1 hr)** Calculations and related conversions of each: Metric system- length; surface; weight - Square measures - Cubic measures (volumetric) - Circular or angular measure	Lecture and PowerPoint presentation	
36	Concentrations- percent volume; ppt; ppm - Chemical – molarity, normality - Temperature- Celsius, centigrade, Fahrenheit	Lecture and PowerPoint presentation	
	CIA-II	2 hour test	

Teacher 2 (18 Hours)
BIOSTATISTICS

Session	Topic	Method	Remarks
1	Collection of data, Classification of data,	Lecture	
2	Frequency distribution tables	Lecture	
3	Graphical representation: - Bar diagrams, Histogram	Lecture	
4	Pie diagram and Frequency curves	Lecture	
5	Mean	Lecture	
6	Median	Lecture	
7	Mode	Lecture	
8	Range, Quartile Deviation	Lecture	
9	Mean Deviation, Standard Deviation	Lecture	
10	Standard error	Lecture	
11	Normal, distribution and Binomial distribution	Lecture	
12	Poisson distribution	Lecture	
13	Correlation- Types of correlation	Lecture	
14	Basic concept of hypothesis testing	Lecture	
15	Levels of significance, test of significance	Lecture	
16	Procedure for testing hypothesis	Lecture	
17	Types of hypothesis- Null hypothesis and Alternate hypothesis	Lecture	
18	Chi- square test	Lecture	

Basic Reference:

Sinha, Pradeep K. and Sinha, Priti. [2003], *Computer Fundamentals – concepts systems and applications,* Third Edition, BPB publications, New Delhi

Gupta, Vikas [2002], *Comdex –computer course kit,* Eight Edition, Dramtech, New Delhi.

Claverie & Notredame, Bioinformatics - A Beginners Guide, Wiley-Dreamtech India Pvt Ltd, 2003

Dan E. Krane and Michael L. Raymer, Fundamental Concepts of Bio-informatics, Pearson Education.

Dutta, Naren. [2002], *Fundamental of Biostatistics- Practical Approach,* Kanishka Publishers, New Delhi.

Rastogi, V.B .2009. Fundamentals of Biostatistics, Ane Books Pvt. Ltd. New Delhi.

COURSE PLAN

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

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

	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	
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 I	**1 hr**	
23	Yoga, meditation and relaxation	Lecture and ppt	
24	Psychoneuroimmunology	Lecture	
25 – 28	Seminar		
29 – 30	Revision		

	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…	
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
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
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
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 – 38	Seminar	ICT Enabled (ppt); discussion
39 – 42	Revision	

Selected Further Readings

1. Fashey, Tomas D, Insel, Paul M and Roth Walt (2005) Fit and Well. New York; Mc Graw Hill Inc
2. Greenberg, Jerol S and Dintiman George B (1997) Wellness Creating a life of Health and Fitness , London Allyn and Bacon Inc.
3. Edlen Gordon Janes and Barttlet. Human Genatics a modern Synthesis. Published by Boston.
4. Monica Cheesbrough, Laboratory Manual for Tropical Counties Vol.II LBS.
5. Norman Bezzaant HELP First Aid for everyday emergencies. Jaico Publishing House, Bombay, Delhi
6. Pelczar M.J. Jr. E.C.S. Chane & N.R. Krieg, Microbiology (Concept & Applications)
7. Rai. B.C. Health Education and Hygiene. Published by Prakashan Kendra, Lucknow