

**SACRED HEART COLLEGE (AUTONOMOUS)**

**DEPARTMENT OF ZOOLOGY**

**BACHELOR OF SCIENCE IN ZOOLOGY**

**Course plan**

**Academic Year 2018-19**

**Semester 6**

## **SEMESTER VI**

### **COURSES OFFERED**

<b>COURSE CODE</b>	<b>TITLE OF THE COURSE</b>	<b>TOTAL HRS./S EM</b>	<b>CREDITS</b>	<b>NO. HRS./WEE K</b>
15U6CRZOO09	Reproductive and Developmental Biology	54	3	3
15U6CRZOO10	Genetics and Biotechnology	54	3	3
15U6CRZOO11	Microbiology and Immunology	54	3	3
15U6CRZOO12	General informatics, Bioinformatics and Biostatistics	54	3	3
15U6CRZOO13	Nutrition, community health and Sanitation	72	4	3

PROGRAMME	BACHELOR OF ZOOLOGY	SEMESTER	6
COURSE CODE AND TITLE	15U6CRZOO09: CORE COURSE 9 REPRODUCTIVE AND DEVELOPMENTAL BIOLOGY	CREDIT	3
HOURS/WEEK	3	HOURS/SEM	54
FACULTY NAME	SMITHA S , RAAGAM PM		

### COURSE OBJECTIVES OF 15U6CRZOO09

COURSE OBJECTIVES
Understand the definition, sub-divisions, terms, early history, applications and scope of embryology
Understand the concepts of gametogenesis, fertilization, cleavage, blastulation, gastrulation, fate maps and egg types
Understand the embryology of human, chick, frog and drosophila
Understand the sexual cycle
Understand the experimental embryology and regeneration in animals
Understand the concept of teratology
Understand the birth and developmental defects

SESSION	TOPIC	LEARNING RESOURCES	VALUE ADDITIONS	REMARKS
<b>Module I – Introduction</b>				
1	Scope of developmental biology, definition, sub-divisions (Descriptive, Comparative, Experimental).	ICT Enabled (ppt & images, video clippings)	Video	
2	Early history of embryology. (Preformation and Epigenesis, Recapitulation theory or Biogenetic law, Germplasm theory (Weisman)	ICT Enabled (ppt & images, charts, video clippings)		
3	Gametogenesis. Spermatogenesis (brief account),	ICT Enabled (ppt & images, video clippings)	Video	
4	Structure of sperm, different types.	ICT Enabled (ppt & animations, images, video clippings)		
5	Oogenesis (brief account), significance of	ICT Enabled	Video	

	gemetogenesis	(ppt & images, video clippings)		
6	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.	ICT Enabled (ppt & images, video clippings)		
7	Fertilization Approach and binding of spermatozoa, activation of the egg, amphimixis.	ICT Enabled (ppt & images, video clippings)		
8	Parthenogenesis (brief account) natural and artificial. Arrhenotoky, Thelytoky, Obligatory and Facultative, Significance	ICT Enabled (ppt & images, video clippings)		
9	CIA I	1 hr; descriptive answers only		
<b>Module II : Cleavage</b>				
10	Types, planes of cleavage (radial and spiral with examples) Cell lineage (brief account). Holoblastic (equal, unequal) and Meroblastic cleavage (discoidal and superficial). Patterns of cleavage (radial , bilateral and rotative). Influence of yolk on cleavage.	ICT Enabled (ppt & images, video clippings)		
11	Blastulation Blastula formation, Types of blastula (coeloblastula, stereoblastula, Discoblastula, Blastocyst with examples).	ICT Enabled (ppt & images, video clippings)		
12	Fate maps Concept of fate maps, construction of fate maps. (artificial and natural). A typical vertebrate fate maps. Significance of fate map.	ICT Enabled (ppt, images, animations & video clippings)		
13	Gastrulation Definition, Morphogenetic cell movements (brief account).	ICT Enabled (ppt & images, charts, video clippings)		
14	Epiboly.	ICT Enabled (ppt & images, video clippings)		
15	Emboly (invagination, involution , delamination ,	ICT Enabled		

	convergence, divergence infiltration).	(ppt & images, video clippings)		
16	Concept of germ layers (brief account) and its derivatives	ICT Enabled (ppt & images, video clippings)		
<b>Module III: Embryology of Frog</b>				
17	Gametes, Fertilization, cleavage, blastulation, fate map,	ICT Enabled (ppt & images, video clippings)		
18	gastrulation, notogenesis ,	ICT Enabled (ppt & images, video clippings)		
19	neurulation, development of nervous system	ICT Enabled (ppt & images, video clippings)		
20	sense organs (eye only)	ICT Enabled (ppt & images, video clippings)		
21	Metamorphosis (brief account only).	ICT Enabled (ppt & images, video clippings)		
<b>Module IV : Embryology of chick</b>				
22	Structure of egg,	ICT Enabled (ppt & images, video clippings)		
23	fertilization, cleavage, blastulation, gastrulation.	ICT Enabled (ppt & images, video clippings)		
24	18 hour chick embryo	ICT Enabled (ppt & images, video clippings)		
25	24 hour chick embryo.	ICT Enabled (ppt & images, video clippings)		
26	Extra embryonic membranes in chick.	ICT Enabled (ppt & images,		

		video clippings)		
<b>Module V : Human development</b>				
27	Human reproductive organs	ICT Enabled (ppt & images, video clippings)		
28	Sexual cycle Estrus cycle (non-primate)	ICT Enabled (ppt & images, video clippings)		
29	Hormonal control of menstrual cycle.	ICT Enabled (ppt & images, video clippings)		
30	Menstrual cycle (primate cycle).	ICT Enabled (ppt & images, video clippings)		
31	Gametes, Blastocyst, Morula, Implantation,	ICT Enabled (ppt & images, video clippings)		
32	foetal membranes and placenta formation.	ICT Enabled (ppt & images, video clippings)		
<b>Module VI : Embryonic development of Drosophila</b>				
33	Early embryonic	ICT Enabled (ppt & images, video clippings)		
34	control of genes over developmental process	ICT Enabled (ppt & images, video clippings)		
<b>Module VII Experimental embryology.</b>				
35	Spemann's constriction experiments	ICT Enabled (ppt & images, video clippings)		
36	Organizer and embryonic induction.	ICT Enabled (ppt & images, charts, video clippings)		

<b>Module VIII Applications of embryology</b>				
37	Contraception & birth control.	ICT Enabled (ppt & animations, images, video clippings)		
38	Abortion Assisted fertilization, Invitro fertilization (test tube baby), Embryo transfer technology	ICT Enabled (ppt & images, video clippings)		
39	Amniocentesis, Cloning	ICT Enabled (ppt & images, video clippings)		
40	Stem cells (Totipotency, Pleuripotency, Unipotency) and stem cell research. Ethical issues related to embryological experiments.	ICT Enabled (ppt & images, charts, video clippings)		
<b>Module IX Regeneration in animals</b>				
41	General survey of regeneration among animals	ICT Enabled (ppt & images, charts, video clippings)		
42	limb regeneration in amphibia	ICT Enabled (ppt & images, video clippings)		
43	<b>CIA II</b>			
<b>Module X Teratology / Dysmorphology</b>				
44	Teratogen / Teratogenic agents	ICT Enabled (ppt & images, charts, video clippings)		
45	Teratogen / Teratogenic agents	ICT Enabled (ppt & images, video clippings)	Video	

46	Ionizing radiation, Chemicals, drugs,	ICT Enabled (ppt & images, charts, video clippings)		
47	infection (herpes virus,	ICT Enabled (ppt & images, video clippings)		
48	parvo virus-B 19, rubella virus,	ICT Enabled (ppt & images, charts, video clippings)		
49	syphilis, cytomegalovirus , toxoplasmosis.	ICT Enabled (ppt & images, charts, video clippings)		
50	hormones and vitamins as teratogens	ICT Enabled (ppt & images, charts, video clippings)		
<b>Module XI-Developmental defects</b>				
51	Prenatal death (miscarriage and still birth).	ICT Enabled (ppt & images, charts, video clippings)		
52	Intrauterine Growth Retardation (IUGR)	ICT Enabled (ppt & images, video clippings)		
53	Revision	ICT Enabled (ppt & images, charts, video clippings)		
54	Course evaluation			



### INDIVIDUAL ASSIGNMENTS/SEMINAR – Details & Guidelines

	Date of completion	Topic of Assignment & Nature of assignment (Individual – Written/Presentation – Graded or Non-graded etc)
1	20/2/2019	Draw different stages of chick development
2	23/2/2019	Regeneration

### GROUP ASSIGNMENTS/ACTIVITES – Details & Guidelines

	Date of completion	Topic of Assignment & Nature of assignment (Individual/Group – Written/Presentation – Graded or Non-graded etc)
1	15/2/2019	Development of chick

### References

Balnisky B.I 1981 An Introduction to Embryology, W.B. Saunders and Co.

Dutta 2007 Obstrestics , Church Livingston 17 Ed

Harrison , Harriosns Book of Internal Medicine Chruch Livingston 17<sup>th</sup> Ed.

Majumdar N. N - Vetebrate embryology

Vijayakumarn Nair K. and P. V George. A manual of developmental biology, Continental publications , Trivandrum

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

### Selected Further Readings

Berril, N.J and Kars G. 1986. Developmental biology, Mc Graw Hills

Berry A. K - An introduction to embryology.

PROGRAMME	<b>BACHELOR OF ZOOLOGY</b>	SEMESTER	4
COURSE CODE AND TITLE	<b>15U6CRZOO10: CORE COURSE 10 GENETICS AND BIOTECHNOLOGY</b>	CREDIT	3
HOURS/WEEK	3	HOURS/SEM	54
FACULTY NAME	RAAGAM PM: 2 hr; FR. JOBY MALAMEL :1 hr		

**COURSE OBJECTIVES OF 15U6CRZOO10**

Understanding of scope and importance of genetics, brief explanation of terms and laws of genetics
Understanding of gene interactions. Linkage and recombination of genes
Understanding of sex determination in man, honey bees, hormonal influence and environmental influence on sex and study of mutations, its types and molecular basis of mutations and understanding the concept of extra nuclear inheritance
Understanding of bacterial genetics, bacterial gene transfer, drug resistance, transposons, transposable genetic elements
Understanding of Human genetics, genetic disorders in man, autosomal and sex chromosomal anomalies,
Understanding of biotechnology, scope, importance, basic aspects of genetic engineering,, tools, vectors, DNA isolation, techniques in gene transfer
Understanding of general techniques in biotechnology, gene cloning, blotting techniques, hybridization techniques, stem cultures
Understanding of practical applications of biotechnology and problems and hazards of genetic engineering

Sessions	Topic	Learning Resources	Value Additions	Remarks
1	<b>Module I Introduction</b> 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,	PPT, Lecture		
2	Mendelism – Mendel’s laws ,Mendelian traits in man Chromosome theory of heredity.	Lecture with interaction		
3	<b>Module II</b> <b>Interaction of genes:</b> Allelic and non Allelic. Allelic- incomplete dominance and Co-dominance	PPT, 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)	PPT, Lecture		
5	Pleiotropism, modifying genes, lethal genes (Brief account with one example each)	PPT, Lecture		
6	Multiple alleles(eg) Coat Colour in rabbits. Man ABO blood group Rh factor	PPT, Lecture	Video	
7	Blood group and its inheritance . Revision of Module II.	PPT, Lecture		
8	<b>Module III Linkage and recombination</b> Linkage and recombination of genes based on Morgan’s work in Drosophila (Complete and incomplete linkage) .	PPT, Lecture		
9	Linkage map	PPT, Lecture		
10	Chromosome mapping	PPT, Lecture		
11	<b>First Internal Examination</b>			
12	<b>Module IV : Sex determination</b> Sex determination: Chromosome theory of sex determination (sex chromosomes and autosomes ) chromosomal mechanism (XX-XO, XX-XY, ZW-ZZ)	PPT, Lecture		
13	Barr bodies and Lyon hypotheses : Sex determination in man- role of Y chromosome. Sex determination in honey bees. Genic balance theory.	PPT, Lecture		
14	Drosophila- intersex, gynandromorphs. Hormonal Influence on sex determination Environmental influence - Hermaphroditism	PPT, Lecture		
	<b>I CIA</b>	Descriptive		

15	<b>Module V Mutations</b> Mutations, Types of Mutations.	PPT, Lecture		
16	Germinal, Sex linked mutations	PPT, Lecture		
17	Chromosomal mutations - structural and numerical changes.	Lecture and ppt		
18	Gene mutation (point mutation) Molecular basis of gene mutations – tautomerism- Induced mutations Physical and chemical mutagens	PPT, Lecture		
19	Revision of Module	Questions & doubt clearing		
20	<b>Module VI Extra nuclear inheritance</b> Extra nuclear inheritance, Mitochondrial and plastid DNA	PPT, Lecture	Video	
21	Kappa particles in Paramecium	PPT, Lecture	Video	
22	<b>Module VII Bacterial genetics</b> Bacterial genetics - Recombination, Transformation,	Lecture and ppt		
23	Transduction, Conjugation, F mediated sexduction, Resistance transfer factor (RTF)	Lecture and ppt		
24	Mechanism of drug resistance in bacteria, Transposable genetic elements in bacteria	Lecture and ppt		
25	Basic components and mechanisms of transposition in bacteria.	Lecture and ppt		
26	Class test	Descriptive test		
27	<b>Module VIII Human Genetics</b> Karyotyping, Pedigree analysis, Aneuploidy and non-disjunction, genetic disorders in man	Lecture and ppt	Video	
28	Chromosomal anomalies – autosomal and sex chromosomal, single gene disorders, gene mutation and disorders	Lecture and ppt	Video	
29	Autosomal single gene disorders, inborn errors of metabolism	Lecture and ppt		
30	Sex linked inheritance, pseudoautosomal genes, multifactorial disorders	PPT, Lecture		
31	Sex limited and sex influences traits, prenatal diagnosis, ultrasound scanning and fetoscopy	Lecture and ppt		
32	Genetic counselling, eugenics and euthenics	Lecture and ppt		
33	Class test	Descriptive test		
34	<b>Module IX - Introduction to biotechnology</b>	Lecture and		

	Introduction to biotechnology, basic aspects of genetic engineering	ppt		
35	<b>Module X - Tools and vectors in genetic engineering</b> Tools and vectors	Lecture and ppt		
36	Isolation of genes/DNA, techniques of rDNA, techniques of production of rDNA	Lecture and ppt		
37	rDNA transfer, cloning and DNA mediated gene transfer	Lecture and ppt		
38	Class test	Descriptive test		
39	PCR and DNA amplification	Lecture and ppt		
40	<b>Module XI – General Techniques</b> Blotting techniques – Southern, Northern and Western Blotting	Lecture and ppt		
41	Identification of DNA, mRNA and Protein	Lecture and ppt		
42	DNA hybridization and DNA finger printing	Lecture and ppt		
43	RFLP markers, Gene libraries,	Lecture and ppt		
44	Construction of genomic library and cDNA library	Lecture and ppt		
45	<b>Module XII – Practical Applications</b> Stem cell cultures – types and uses	Lecture and ppt		
46	Applications of Biotechnology, SCP, Tissue culture,	Lecture and ppt		
47	Gene therapy, Stem cell therapy	Lecture and ppt		
48	Monoclonal antibodies, Hormones, Antibiotics, Vaccines	Lecture and ppt		
49	<b>II CIA</b>	Descriptive test		
50	Agricultural biotechnology, microbial insecticides	Lecture and ppt		
51	<b>Module XIII - Problems and Hazards</b> Hazards of biotechnology, problems, patenting and patent protection	Lecture and ppt		
52	Biowar and biopiracy	Lecture and ppt		
53	Class test	Descriptive test		

54	Revision and Evaluation	Questioning		
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### ASSIGNMENTS

Sessions	Date of Submission	Topic of Assignment & Nature of assignment (Individual/Group – Written/Presentation – Graded or Non-graded etc)
1	06-12-2018	Applications of Biotechnology
2	27-01-2019	Biowar and Biopiracy

### Text Books and References

Bala Subramanian D., C.F & Bryle & K. Dharmarajan J. Green Kunthala Jayaraman, Concept in Biotechnology. University Press 2007

Benjamin Lewin 2004 Gene VIII Oxford University Press

Brown C.H., Campbell I & Priest F, G. 1987. Introduction of Biotechnology (Blackwell scientific publishers Oxford)

C.W. Fox, J.B. Wolf Evolutionary Genetics Concept of Case Studies, Oxford university Press 2006

Colin Ratledge & Bjorn Kristiansen, Basic Biotechnology 3 rd ed. Cambridge University (2008)

De Robertis E.D. and De. Robertis E.M. 1987 cell & Molecular Biology (Lea & Febya / Info- Med)

Desmand S.T. Nicholi An introduction to Genetic Engineering Cambridge Sec, Ed. 2007.

Frank H, Stephenson Calculation for Molecular Biology and Biotechnology . Academic press 2006

Gardner E.J. and Snustand D.P. 1984. Principles of Genetcis (John Wiley & Sons New York.)

Gerhard Fuchs. Biotechnology & in Corporative Perspective. Study in global Competition series, Ane Book 2003

Jan Vijay Aging of the Genome The dual role of DNA in life and Deaths. Oxford university Press 2008

Janarthanan S & Vincent S., Practical Biotechnology, Method of Protocols. University Press . 2007

John E. Smith Biotechnology Cambridge Low priced ed. (Third Ed) 2005

Madingan , Martinko and Parker 2002, Biology of Microorganisms , Brock Eighth Ed. Prentice Hall

Powar. C.B. 1983. Cell biology (Himalaya Publishing company )

Prave D. Faustu and Sitting W and Subasten D.A (Eds) 1987 Fundamentals of Biotechnology (VCH publishers. Germany)

R.C. Sobte and Suparna. S. Pachauri. Essentials of Biotechnology Ane Book Pvt. Ltd. 2009

Singh B.D. Biotechnology 2002, Kalyan Publishers New Delhi.

Sinnat Dunn & Dobzhansky 1959. Principles of Genetics (T.M.H. New Delhi)

Stern C. 1973. Principles of Human Genetics (W.H. Freeman and Co.)

Strickberger W.M. 1990. Genetics (Mac Millan Publishing Co.)

Sudha Gangal Biotechnology Principles And & practice of Animal Tissue culture, Universities Press 2007

Susantha Gosnalibke – Merged Evolution (Long term implication of Biotechnology and Information Technology) Gordon & Breech Pub. 2005

Veer Bala Rastogi – Fundamental of Mol. Biology Ane students Education 2008

Verma P.S. and Agarwal V.K. 1988 Genetics (S. Chand and Co. New Delhi)

Winchester A.M. 1966. Genetics (Oxford & IBH Publications).

PROGRAMME	<b>BACHELOR OF ZOOLOGY</b>	SEMESTER	6
COURSE CODE AND TITLE	<b>15U6CRZOO11- MICROBIOLOGY AND IMMUNOLOGY</b>	CREDIT	3
HOURS/WEEK	3	HOURS/SEM	54
FACULTY NAME	SMITHA S , VIDHU V		

**COURSE OBJECTIVES OF 15U6CRZOO11**

<b>COURSE OBJECTIVES</b>
Understand the history and scope of microbiology and outline classification of bacteria, fungi and viruses
Understand the methods in microbiology
Understand basic bacteriology.
Understand basic virology
Differentiate the types and carriers of microbial infections and the diseases caused.
Understand the basics of immunology, antigens and antibodies.
Understand the clinical applications of antigen-antibody reaction.
Understand immune response system and their disorders.



Session	Topic	Learning Resources	Value Additions	Remakrs
	<b>Module I : Microbiology</b>			
1	Introduction and Scope of Microbiology	ICT Enabled (ppt & images, video clippings)	Video	
2	Classification of bacteria, Fungi, Viruses	ICT Enabled (ppt & images, charts, video clippings)		
	<b>Module II : Methods in Microbiology</b>			
3	Sterilisation and disinfection	ICT Enabled (ppt & animations, images, video clippings)		
4	Different methods-Physical	ICT Enabled (ppt & images, video clippings)	Video	
5	Chemical	ICT Enabled (ppt & 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		
	<b>Module III: Bacteria Structure</b>			
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, charts, video clippings)		
13	Spores and Cysts	ICT Enabled (ppt & images, video clippings)		
	<b>Module IV Bacterial Growth</b>			
14	Bacterial Growth, Effect of Various factors on	ICT Enabled (ppt &		

	bacterial growth.	images, video clippings)		
15	Cell Division, Nutrition requirements; Total count, viable count, Bacterial Growth Curve.	ICT Enabled (ppt & images, video clippings)		
	<b>Module V: Basic Virology</b>			
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)		
	<b>Module 6: Infections</b>			
19	Types of infections	ICT Enabled (ppt & images, video clippings)		
20	Contagious diseases	ICT Enabled (ppt & images, video clippings)		
21	Modes of transmission of diseases	ICT Enabled (ppt & images, video clippings)		
22	Different types of carriers	ICT Enabled (ppt & images, video clippings)		
	<b>Module 7: Diseases caused by different pathogens</b>			
23	Bacterial diseases: Tuberculosis & Typhoid	ICT Enabled (ppt & images, video clippings)		
24	Viral : Influenza & Polio	ICT Enabled (ppt & images, video clippings)		
25	Fungal: Dermatophytoses	ICT Enabled (ppt & images, video clippings)		
26	Candidiasis	ICT Enabled (ppt & images, video clippings)		
	<b>PART II IMMUNOLOGY</b> <b>Module 8: Introduction to Immunology</b>			
27	Types of immunity	ICT Enabled (ppt & images, video clippings)		

		clippings)		
28	Mechanism of innate immunity	ICT Enabled (ppt & images, video clippings)		
29	Acquired - passive & active	ICT Enabled (ppt & images, video clippings)		
30	Vaccines types of vaccines , live, killed	ICT Enabled (ppt & images, video clippings)		
31	Vaccines- toxoids, recombinant DNA	ICT Enabled (ppt & images, video clippings)		
32	<b>CIA- I</b>			
	<b>Module 9: Antigens Antibodies Complements</b>			
33	Types of Antigens, haptens, antigenic determinants	ICT Enabled (ppt & images, video clippings)		
34	Basic structure of immunoglobulins.	ICT Enabled (ppt & images, video clippings)		
35	Different classes of immunoglobulins and functions	ICT Enabled (ppt & images, video clippings)		
36	Complement system, biological effects of complements	ICT Enabled (ppt & images, video clippings)		
	<b>Module 10: Antigen-antibody reactions</b>			
37	Precipitation test, Agglutination Test	ICT Enabled (ppt & images, video clippings)		
38	Widal , VDRL, Coombs test	ICT Enabled (ppt & images, video clippings)		
39	HIV test (ELISA) Complement fixation test	ICT Enabled (ppt & images, charts, video clippings)		
	<b>Module 11: Immune Response system</b>			
40	Primary lymphoid organs	ICT Enabled (ppt & images, charts, video clippings)		CO6
41	Secondary lymphoid organs	ICT Enabled (ppt & images, video clippings)		CO6
42	Lymphocytes T & B cells	ICT Enabled (ppt &		CO6

		images, video clippings)		
43	Macrophages, Plasma cells, Memory cells	ICT Enabled (ppt & images, video clippings)		
44	MHC Antibody synthesis	ICT Enabled (ppt & images, charts, video clippings)		
45	Primary and secondary responses	ICT Enabled (ppt & images, video clippings)	Video	
46	Monoclonal antibodies – Hybridoma technology , uses	ICT Enabled (ppt & images, charts, video clippings)		
	<b>Module 12: Immunopathology- immune disorders</b>			
46	Different types of hypersensitivity reactions	ICT Enabled (ppt & images, charts, video clippings)		
48	Different types of hypersensitivity reactions contd.	ICT Enabled (ppt & images, charts, video clippings)		
49	CIA-II	ICT Enabled (ppt & images, charts, video clippings)		
50	Autoimmunity, mechanisms of autoimmunization	ICT Enabled (ppt & images, charts, video clippings)		
51	Lymphadenoid goiter, thyrotoxicosis	ICT Enabled (ppt & images, charts, video clippings)		
52	Rheumatoid arthritis and systemic lupus erythromatosis	ICT Enabled (ppt & images, video clippings)		
53	Transplantation Immunity	ICT Enabled (ppt & images, charts, video clippings)		
54	Immunology of blood transfusion, Erythroblastosis foetalis	ICT Enabled (ppt & images, charts, video clippings)		

### INDIVIDUAL ASSIGNMENTS/SEMINAR – Details & Guidelines

	Date of completion	Topic of Assignment & Nature of assignment (Individual – Written/Presentation – Graded or Non-graded etc)
1	24/2/2019	Structure of bacterium
2	28/2/2019	Immune disorders

### GROUP ASSIGNMENTS/ACTIVITES – Details & Guidelines

	Date of completion	Topic of Assignment & Nature of assignment (Individual/Group – Written/Presentation – Graded or Non-graded etc)
<b>1</b>	18/2/2019	Vaccines

### References

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

<b>PROGRAMME</b>	<b>BACHELOR OF ZOOLOGY</b>	<b>SEMESTER</b>	<b>6</b>
<b>COURSE CODE AND TITLE</b>	<b>15U6RZOO12: General informatics, Bioinformatics, Biostatistics and Research methodology</b>	<b>CREDIT</b>	<b>3</b>
<b>HOURS/WEEK</b>	<b>3</b>	<b>HOURS/SEM</b>	<b>54</b>
<b>FACULTY NAME</b>	<b>Jobin C Tharian</b>		

### **COURSE OBJECTIVES**

MS Word, MS Excel, MS Access
Internet: Access a web page on any biological topic. Frequency distribution, Range and standard deviation and Correlation using any biological data.
Download a specified sequence from NCBI and search with it in BLAST, Download molecular structure data files of DNA, Sugar, Water etc and inspect them through Rasmol
Download a specified DNA sequence from NCBI and identify ORF & genes, if any, in it. Download a specified AA sequence from NCBI and plot its hydrophobicity profile.
Download and study at least two samples of genome sequences. Spotters—copies of genome sequences and proteins.
Graphical representation of data. Construction of bar diagrams, Histograms, Pie diagram and Line graphs.
Micrometry –calibration and measurement of microscopic objects –low power Paper chromatography
Instrumentation

SESSION	TOPIC	LEARNING RESOURCES	VALUE ADDITIONS	REMARKS
<b>MODULE I - Introduction</b>				
1	Microprocessors	PPT/Lecture	Video/e-resource	
2	Disk operating systems	PPT/Lecture	Video/e-resource	
3	DOS, windows, Linux	PPT/Lecture	Video/e-resource	
<b>Module II – Operating systems</b>				
4	Networking	PPT/Lecture	Video/e-resource	
5	Internet, WWW	PPT/Lecture	Video/e-resource	
6	New technology	PPT/Lecture	Video/e-resource	
<b>Module III – Bioinformatics introduction</b>				
7	Nature and scope of bioinformatics	PPT/Lecture	Video/e-resource	
8	Computational biology	PPT/Lecture	Video/e-resource	
9	Databases	PPT/Lecture	Video/e-resource	
10	Comparative biology	PPT/Lecture	Video/e-resource	
11	Comparison	PPT/Lecture	Video/e-resource	
12	Scoring matrices	PPT/Lecture	Video/e-resource	
<b>Module IV</b>				
13	Blast, search engine	PPT/Lecture	Video/e-resource	
14	Multiple sequence alignment	PPT/Lecture	Video/e-resource	

15	Protein structure prediction	PPT/Lecture	Video/e-resource	
16	Molecular phylogenetics	PPT/Lecture	Video/e-resource	
17	Advantages	PPT/Lecture	Video/e-resource	
<b>Module V</b>				
18	Computational procedure	PPT/Lecture	Video/e-resource	
19	Computer aided drug discovery	PPT/Lecture	Video/e-resource	
20	Drug discovery pipeline	PPT/Lecture	Video/e-resource	
21	Bioinformatics tools	PPT/Lecture	Video/e-resource	
22	Rasmol	PPT/Lecture	Video/e-resource	
23	BLAST	PPT/Lecture	Video/e-resource	
24	GENSNIP	PPT/Lecture	Video/e-resource	
<b>Module VI – Future prospects</b>				
25	Human brain project	PPT/Lecture	Video/e-resource	
26	CIA-1			
27	Protein structure prediction	PPT/Lecture	Video/e-resource	
<b>Module VII – Sampling techniques</b>				
28	Data and collection methods	PPT/Lecture	Video/e-resource	
29	Graphical representation	PPT/Lecture	Video/e-resource	
<b>Module VIII – Measures of central tendency</b>				
30	Mean	PPT/Lecture	Video/e-	



			resource	
31	Median	PPT/Lecture	Video/e-resource	
32	Mode	PPT/Lecture	Video/e-resource	
<b>Module IX – Measures of dispersion</b>				
33	Range	PPT/Lecture	Video/e-resource	
34	Quartile deviation	PPT/Lecture	Video/e-resource	
35	Mean Deviation	PPT/Lecture	Video/e-resource	
36	Standard deviation	PPT/Lecture	Video/e-resource	
<b>Module X – Probability distributions</b>				
37	Normal distribution	PPT/Lecture	Video/e-resource	
38	Binomial distribution	PPT/Lecture	Video/e-resource	
39	Poisson distribution	PPT/Lecture	Video/e-resource	
<b>Module XI - Correlation</b>				
40	Correlation types	PPT/Lecture	Video/e-resource	
41	Direct correlation	PPT/Lecture	Video/e-resource	
42	Linear correlation	PPT/Lecture	Video/e-resource	
43	Indirect correlation	PPT/Lecture	Video/e-resource	
<b>Module XII – Test of hypothesis and test of significance</b>				
44	Levels of significance	PPT/Lecture	Video/e-resource	
45	Null and alternate hypothesis	PPT/Lecture	Video/e-	

			resource	
<b>Research methodology, Module I – Tools and techniques in biological research</b>				
46	Scientific drawing	PPT/Lecture	Video/e-resource	
47	Microscopy	PPT/Lecture	Video/e-resource	
48	CIA- II			
49	Bright field microscopy	PPT/Lecture	Video/e-resource	
50	Phase contrast microscopy	PPT/Lecture	Video/e-resource	
51	SEM	PPT/Lecture	Video/e-resource	
52	TEM	PPT/Lecture	Video/e-resource	
Module II – Research methodology				
53	Instrumentation			
Module III – Unit of measurements				
54	Scientific method			

#### **INDIVIDUAL ASSIGNMENTS/SEMINAR – Details & Guidelines**

	<b>Date of completion</b>	<b>Topic of Assignment &amp; Nature of assignment (Individual/Group – Written/Presentation – Graded or Non-graded etc)</b>
1	20/01/2019	Mean, Median, Mode

#### **References**

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Cambridge University press

PROGRAMME	BACHELOR OF SCIENCE	SEMESTER	6
COURSE CODE AND TITLE	15U6CRZOO13: NUTRITION, COMMUNITY HEALTH AND SANITATION	CREDIT	4
HOURS/WEEK	4	HOURS/SEM	72
FACULTY NAME	DR. MATHEW M.J., DR. JOBI M.J. & DR. VIDHU V.V.		

### COURSE OBJECTIVES

Appreciate the importance of health, physical activity, exercise, yoga and programmes related to community health promotion
Explain the concept of balanced diet and awareness on nutritional disorders
Examines the principles of accident prevention and first aid
Discuss the pathology of water borne diseases and their prevention; waste water and solid waste management
Appreciates the need for preventing food borne diseases
Examine the various emerging pathogens and diseases

SESSION	TOPIC	LEARNING RESOURCES	VALUE ADDITIONS	REMARKS
<b>MODULE I</b>				
1	Definition and meaning of health. Dimensions of health.	PPT/Lecture		
2	Physical activity and health benefits	PPT/Lecture		
3	Effect of exercise on body systems – Circulatory and Respiratory	PPT/Lecture	Video	
4	Effect of exercise on body systems –Endocrine	PPT/Lecture	Video	
5	Effect of exercise on body systems –Skeletal	PPT/Lecture	Video	
6	Effect of exercise on body systems – Muscular	PPT/Lecture		
7	Programmes on Community health promotion – individual and family	PPT/Lecture		
8	Programmes on Community health promotion – Society	PPT/Lecture		
9	Dangers of alcoholic and drug abuse, medico legal implications.	PPT/Lecture	Group discussion	

10	Dangers of alcoholic and drug abuse, medico legal implications contd..	PPT/Lecture		
<b>MODULE II</b>				
11	Introduction to concept of food and nutrition.	Seminar; discussion		
12	Balanced diet.	Seminar; discussion		
13	Vitamins and malnutrition	Seminar; discussion		
14	Vitamins contd			
15	Vitamins contd.	Seminar; discussion		
16	Deficiency diseases	Seminar; discussion		
17	Determining of caloric intake and expenditure	Seminar; discussion		
18	Obesity causes and preventive measures	Seminar; discussion		
19	Role of diet and exercise.	Seminar; discussion		
20	BMI	Seminar; discussion		
<b>MODULE III</b>				
21	Introduction to safety education	Seminar; discussion		
22	Principles of accident prevention	Seminar; discussion		
23	Health and safety in daily life and at work	Seminar; discussion		
24	First aid and emergency care	Seminar; discussion		
25	Common injuries and their management	Seminar; discussion		
26	CIA-1			
27	Modern lifestyle and hypokinetic diseases	Seminar; discussion		
28	Diabetes, Cardiovascular diseases	Seminar; discussion		
29	Diet & Cancer - Prevention and Management	Seminar; discussion		
30	Ageing, Theories of Ageing	PPT/Lecture		
31	Cellular changes with ageing	PPT/Lecture		
32	Revision			
<b>MODULE IV</b>				
33	Introduction to life skill education	PPT/Lecture		

34	Physical activity, emotional adjustment and well being	PPT/Lecture		
35	Yoga, meditation and relaxation	PPT/Lecture		
36	Yoga, meditation and relaxation contd.	L PPT/Lecture		
37	Psychoneuroimmunology	Lecture		
38	Psychoneuroimmunology contd.	Lecture	Discussion	
<b>MODULE V</b>				
39	Potable water quality monitoring and waste water management.	ICT Enabled (ppt & animations, images, video clippings); discussion		
40	Potable water quality monitoring and waste water management. Contd..	ICT Enabled (ppt & animations, images, video clippings); discussion		
41	Determination of sanitary quality of drinking water	ICT Enabled (ppt & animations, images, video clippings); discussion		
42	Water purification techniques.	ICT Enabled (ppt & animations, images, video clippings); discussion		
43	Water purification techniques.Contd...	ICT Enabled (ppt & animations, images, video clippings); discussion		
44	Water purification techniques Contd...	ICT Enabled (ppt & animations, images, video clippings); discussion		
45	Faecal bacteriae and pathogenic microorganisms transmitted by water.	ICT Enabled (ppt & animations,		

		images, video clippings); discussion		
46	Faecal bacteriae and pathogenic microorganisms transmitted by water.Contd...	ICT Enabled (ppt & animations, images, video clippings); discussion		
47	Cholera and Typhoid.	ICT Enabled (ppt & animations, images, video clippings); discussion		
48	Cholera and Typhoid. contd...	ICT Enabled (ppt & animations, images, video clippings); discussion		
49	Vermicomposting a method of solid waste management	ICT Enabled (ppt & animations, images, video clippings); discussion		
50	Revision			
<b>MODULE VI</b>				
51	Public Health and Food borne diseases	PPT/Lecture		
52	Public Health and Food borne diseases contd...	PPT/Lecture	Video	
53	Food Poisoning causes and prevention	PPT/Lecture		
54	Food poisoning caused by toxins produced by microbes eg Staphylococcal food poisoning,	PPT/Lecture		
55	Botulism, Salmonellosis			
56	Botulism, Salmonellosis contd...	Lecture	Debate	
57	Food infection caused by growth of microorganisms	PPT/Lecture		

	in the human body after the contaminated food has been eaten.			
58	Food Infection hepatitis (hepatitis A)	PPT/Lecture		
59	Food Infection hepatitis (hepatitis A). Contd...	PPT/Lecture		
60	Waterborne diseases and food borne diseases	PPT/Lecture		
61	CIA II			
<b>MODULE VII</b>				
62	Emerging pathogens and diseases – Introduction; Swine flue (H1N1), bird flue (H5N1)	Lecture and PPT		CO 6
63	Emerging pathogens and diseases –SARS, Anthrax	Lecture and PPT		CO 6
64	Reemerging pathogens and diseases – TB	Lecture and PPT		CO 6
65	Vector borne diseases (mosquito) and their control measures; Mosquito eradication	Lecture and PPT		CO 6
66	Vector borne diseases mosquito- Chikungunya , Malaria	Lecture and PPT		CO 6
67	Vector borne diseases mosquito- Filariasis and Dengu fever	Lecture and PPT		CO 6
68	Leptospirosis and preventive measures – Rodent control measures	Lecture and PPT		CO 6
69	Cancer different types	Lecture and PPT		CO 6
70	Causes of cancer, carcinogens, diet & cancer	Lecture and PPT	Group Discussion	CO 6
71	HIV, AIDS – causes & preventive measures	Lecture and PPT		CO
72	Revision			

#### **INDIVIDUAL ASSIGNMENTS/SEMINAR – Details & Guidelines**

	Date of completion	Topic of Assignment & Nature of assignment (Individual/Group – Written/Presentation – Graded or Non-graded etc)
1	4/1/2019	Vitamins
2	5/1/2019	Life style diseases

#### **GROUP ASSIGNMENTS/ACTIVITES – Details & Guidelines**

	Date of completion	Topic of Assignment & Nature of assignment (Individual/Group – Written/Presentation –



		Graded or Non-graded etc)
1	12/12/2018	Dangers of alcohol and drug addiction
2	18/01/2019	New and emerging diseases

### References

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