Lady Doak College

AUTONOMOUS

1.1.2 Percentage of Programmes where syllabus revision was carried out during 2015-2020

Lady Doak College, Madurai – 2

(An Autonomous Institution Affiliated to Madurai Kamaraj University)

COLLEGE WITH POTENTIAL FOR EXCELLENCE

Re-accredited (3rdcycle) by NAAC with Grade 'A'

CGPA 3.44 on a 4 point scale

PLATINUM JUBILEE

SCIENCES

ACADEMIC COUNCIL MEETING

3rd April, 2019

Revised copy

APPENDIX 'BB'

Lady Doak College, Madurai

(An Autonomous Institution Affiliated to Madurai Kamaraj University)

59th Academic Council Meeting

3rd April 2019, Dr. Betty Chinniah Multimedia Theatre

CHAIRPERSON: Dr. Christianna Singh
Principal & Secretary

A G E N D A

1. *Prayer*
2. *Introductory Remarks – Chairperson*
3. *Confirmation of minutes of the 58th Academic Council Meeting held on 3rd April, 2018*
4. *Introduction of Programmes and Norms*

1. *Tamil*
2. *English*
3. *History*
4. *Social Sciences*
5. *Economics*
6. *Commerce*
7. *Business Administration*
8. *Mathematics*
9. *Physics*
10. *Chemistry*
11. *Botany*
12. *Zoology*
13. *Biotechnology*
14. *Computer Science*
15. *Fashion Designing*
16. *Psychology*
17. *Centre for Entrepreneurship Development*
18. *Value Based Course*
19. *Curriculum Planning and Evaluation Cell*

5. *Concluding Remarks – Chairperson*

Z. Helen Nirmala Elizabeth R
DEANS OF ACADEMIC AFFAIRS

02/04/19
PRINCIPAL

DEPARTMENT OF ZOOLOGY

PREAMBLE

The present curriculum of B.Sc. Zoology (Spl. in Biotechnology) was reviewed and based on which it is found necessary to introduce a few changes in the following courses:

- ZOO3501CM BIOCHEMISTRY has been changed to ZOO3503CM BIOCHEMISTRY
- ZOO3502CM ANIMAL PHYSIOLOGY has been changed to ZOO3504CM ANIMAL PHYSIOLOGY
- ZOO3205CP LAB IN PHYSIOLOGY AND ENVIRONMENTAL BIOLOGY has been changed to ZOO3206CP LAB IN PHYSIOLOGY AND ENVIRONMENTAL BIOLOGY
- ZOO4503CM MOLECULAR BIOLOGY has been changed to ZOO4505CM MOLECULAR BIOLOGY
- ZOO4504CM GENETICS has been changed to ZOO4506CM GENETICS
- ZOO4302CP LAB IN MOLECULAR BIOLOGY AND IMMUNOLOGY has been changed to ZOO4303CP LAB IN MOLECULAR BIOLOGY AND IMMUNOLOGY
- ZOO4202CP LAB IN GENETICS has been changed to ZOO4203CP LAB IN GENETICS
- ZOO5201CP LAB IN GENETIC ENGINEERING has been changed to ZOO5202CP LAB IN GENETIC ENGINEERING
- ZOO6301CP LAB IN PLANT AND ANIMAL BIOTECHNOLOGY has been changed to ZOO6302CP LAB IN PLANT AND ANIMAL BIOTECHNOLOGY
- ENZO4201EI LITERATURE AND ENVIRONMENT has been changed to ENZO4202EI LITERATURE AND ENVIRONMENT

The course profile along with the syllabi of the modified courses is presented.

COURSE PROFILE

B.Sc. Zoology (Spl. in Biotechnology)

From 2018 batch onwards

Sem.	Course Code	Course Title	Course Type	Hrs./Wk.		Credits	Passed in Academic Council	Offered to	Offered by
				TH	LA				
III	ZOO3401CT*	DEVELOPMENTAL BIOLOGY	LT	3	1	4		AUZOO	ZOO
	ZOO3503CM	BIOCHEMISTRY	TH	5		5		AUZOO	ZOO
	ZOO3504CM	ANIMAL PHYSIOLOGY	TH	5		5		AUZOO	ZOO
	ZOO3206CP	LAB IN PHYSIOLOGY AND ENVIRONMENTAL BIOLOGY	LA		4	2		AUZOO	ZOO
	ZOO3204CP	LAB IN CELL BIOLOGY AND BIOCHEMICAL TECHNIQUES	LA		4	2	AW2015	AUZOO	ZOO
		ALLIED COURSE	TH	5		4	AV2014	AUZOO	MAT
		NON-MAJOR ELECTIVE	LA	2		2	AV2014		
		VOCATIONAL COURSE				2	AV2014	AUZOO	ZOO

Sem.	Course Code	Course Title	Course Type	Hrs./Wk.		Credits	Passed in Academic Council	Offered to	Offered by
				TH	LA				
	VBC0102FV/ VBC0103FV	CIVIC EDUCATION / FAMILY LIFE EDUCATION	TH	1		1	AV2014	ALLM	Centre for VE
	UIV3101FI	CIVICS AND THE BIBLE						AUCH / SUCH	
		Total		30		27			
IV	ZOO4505CM	MOLECULAR BIOLOGY	TH	5		5		AUZOO	ZOO
	ZOO4506CM	GENETICS	TH	5		5		AUZOO	ZOO
	ZOO4502CM	IMMUNOLOGY	TH	5		5	AW2014	AUZOO	ZOO
	ZOO4203CP	LAB IN GENETICS	LA	3		2		AUZOO	ZOO
	ZOO4303CP	LAB IN MOLECULAR BIOLOGY AND IMMUNOLOGY	LA	5		3		AUZOO	ZOO
		NON-MAJOR ELECTIVE	TH	2		2	AV2014		
	ZOO4202SP	LAB IN BASIC CLINICAL DIAGNOSTICS	LA		2	2	BA2018	AUZOO	ZOO
		LIBRARY		1				AUZOO	ZOO
	VBC0202FV/ VBC0203FV	HUMAN RIGHTS AND DUTIES / FOUNDATION COURSE ON WOMEN'S STUDIES	TH	2		2	AV2014 / AY2016	ALLM	Centre for VE
	UIV4201FI	HUMAN RIGHTS IN THE BIBLE						AUCH/ SUCH	
		Total		30		26			
V	ZOO5401CM	EVOLUTION	TH	4		4	AW2015	AUZOO	ZOO
	ZOO5503CT	BIOPROCESS AND MICROBIAL BIOTECHNOLOGY	LT	4	2	5	AZ2017	AUZOO	ZOO
	ZOO5402CM	GENETIC ENGINEERING	TH	4		4	AW2015	AUZOO	ZOO
	ZOO5202CP	LAB IN GENETIC ENGINEERING	LA	4		2		AUZOO	ZOO
		INTERDISCIPLINARY COURSES	TH	4		4	AW2015		
	ZOO5201CM	INTRODUCTION TO RESEARCH METHODOLOGY	TH	2		2	AY2016	AUZOO	ZOO
	ZOO0601LM	WOMEN AND HEALTH	TH	4			AW2015	AUZOO	ZOO
	VBC0202FV/ VBC0203FV	HUMAN RIGHTS AND DUTIES / FOUNDATION COURSE ON WOMEN'S	TH	2		2	AV2014 / AY2016	ALLM	Centre for VE

Sem.	Course Code	Course Title	Course Type	Hrs./Wk.		Credits	Passed in Academic Council	Offered to	Offered by
				TH	LA				
		STUDIES							
	UIV5201FI	BIBLICAL PERSPECTIVES ON WOMEN						AUCH/ SUCH	
		Total		30		23			
VI	ZOO6501CM	PLANT AND ANIMAL BIOTECHNOLOGY	TH	6		5	AW2015	AUZOO	ZOO
	ZOO6502CM	ANIMAL BEHAVIOUR	TH	5		5	AW2015	AUZOO	ZOO
	ZOO6503CM	ECONOMIC ENTOMOLOGY	TH	5		5	AW2015	AUZOO	ZOO
	ZOO6302CP	LAB IN PLANT AND ANIMAL BIOTECHNOLOGY	LA	5		3		AUZOO	ZOO
		INTERDISCIPLINARY COURSES	TH	4		4	AW2015	AUZOO & AUBOT	ZOO & BOT
	ZOO0601LM	WOMEN AND HEALTH	PR	4		6		AUZOO	ZOO
	VBC6101FV	ENHANCING SOCIAL GRACE	TH	1		1		ALLM	Centre for VE
	UIV6101FI	BIBLICAL PERSPECTIVES ON LEADERSHIP						AUCH/ SUCH	
		Total		30		29			

* Content remains the same, course shifted to a different semester

Extra Credit Courses – Refer Pg. No. 293

COURSES OFFERED TO STUDENTS OF OTHER DEPARTMENTS

NON-MAJOR ELECTIVES

Sem.	Course Code	Course Title	Course Type	Hrs./Wk.		Credits	Passed in Academic Council	Offered to	Offered by
				TH	LA				
III	CHZO3201EI	FOOD, NUTRITION AND HEALTH CARE	LA		2	2	AZ2017	AUALLM	ZOO & CHE
	ECZO3204EI	ECONOMICS OF DAIRY FARMING	TH	2		2	BA2018	AUALLM	ZOO & ECO
IV	ENZO4202EI	LITERATURE AND ENVIRONMENT	TH	2		2		AUALLM	ZOO & ENG
	SSZO4201EI	REPROGRAMMING OF THE BRAIN	TH	2		2	AZ2017	AUALLM	ZOO & SOC

INTERDISCIPLINARY COURSES

Sem.	Course Code	Course Title	Course Type	Credits	Passed in Academic Council	Offered to	Offered by
V	BOZO5401DM	BIOSAFETY AND BIOETHICS	TH	4	AW2015	ZOO & BOT	ZOO & BOT

Sem.	Course Code	Course Title	Course Type	Credits	Passed in Academic Council	Offered to	Offered by
	MAZO5401DM	MEDICAL STATISTICS	TH	4	BA2018	ZOO & MAT	ZOO & MAT
VI	BOZO6401DM	FORESTS AND WILD LIFE MANAGEMENT	TH	4	AW2015	ZOO & BOT	ZOO & BOT
	PHZO6401DM	BIOMEDICAL INSTRUMENTATION	TH	4	BA2018	ZOO & PHY	ZOO & PHY

SELF-LEARNING COURSES

Sem.	Course Code	Course Title	Course Type	Credits	Passed in Academic Council	Offered to	Offered by
II	ZOO0403CD	MYSTERIES OF BEHAVIOUR	TH	4	AU2013	ALLM	ZOO
IV & VI	ZOO0404CD	BIRD WATCHING	TH	4	AU2013	ALLM	ZOO
III	ZOO0401CD	SERICULTURE	TH	4	AU2013	ALLM	ZOO
V	ZOO0402CD	POULTRY SCIENCE	TH	4	AU2013	ALLM	ZOO

ZOO3503CM BIOCHEMISTRY

(THEORY)

LEARNING OUTCOME 5 hrs./wk.

On successful completion of the course, the student will be able to

- interpret the biochemical basis of processes that occur in human body
- relate the interplay of macromolecules
- apply concepts learnt in clinical diagnosis

COURSE CONTENT:

UNIT I: CARBOHYDRATES 18 hrs.

Introduction – basic concepts and designs – laws of thermodynamics – biological oxidations – high energy compounds – Monosaccharides: structure – isomerism – ring structure of glucose – physical and chemical properties of monosaccharides – oligo and polysaccharides: homo and hetero polysaccharides – glycolysis – citric acid cycle and electron transport chain – role of carbohydrates in living systems.

UNIT II: PROTEINS 15 hrs.

Structure – classification and properties of amino acids – naturally occurring peptides and their functions – conformation of proteins and denaturation – classification of proteins – their structure and role – transamination and deamination reactions.

UNIT III: LIPIDS 12 hrs.

Structure – classification and properties of fatty acids and their derivatives – fats – structure and hydrolysis – lipogenesis and beta oxidation of fatty acids – role of lipids in living systems.

UNIT IV: NUCLEIC ACIDS 15 hrs.

Structure of bases – nucleosides and nucleotides – structural conformation and properties of DNA and RNA – biosynthesis and degradation of nucleic acids – role of nucleic acids in living systems.

UNIT V: VITAMINS AND BIOCATALYSTS 15 hrs.

Vitamins as co-enzymes – types and properties of enzymes – factors affecting enzyme action – enzyme inhibition – enzyme catalysis – catalytic mechanisms.

TEXT BOOK(S):

Sulochana H.R., (2010). Principles *of Biochemistry*, Chennai: PBS Book enterprises, Print.

REFERENCE BOOK(S):

Elliot W. H., and Elliot D.C., (2013). *Biochemistry and Molecular Biology*, India: Oxford University Press, Print.

Lehninger L.A., Nelson D.L. and Cox M.M., (2017). *Principles of Biochemistry*, (7th ed.), New York: W H Freeman and Comp., Print.

McKee T. and McKee R.J., (2013). *Biochemistry an Introduction*, (4th ed.), Philadelphia, USA: Wm.C. Brown Publishers, Print.

Sathyanarayana U. and Chakrapani U., (2013). *Biochemistry*, (4th ed.), Kolkata: Elsevier Pvt., Ltd., Harayana and India Books and Allied Pvt., Ltd., Print.

Stryer L., (2012). *Biochemistry*, (7th ed.), New York: W.H. Freeman Publishers, Print.

Swaminathan M., (2008). *Essesntials of food and nutrition,* (2nd ed.), India: The Bangalore printing and publishing co. ltd., Print.

ZOO3504CM ANIMAL PHYSIOLOGY

(THEORY)

LEARNING OUTCOME 5 hrs./wk.

On successful completion of the course, the student will be able to

- identify the mechanisms of functioning of various organ systems
- relate the fundamental unity in physiological functions
- compare structure and function in various grades of animals

COURSE CONTENT:

UNIT I: NUTRITION AND RESPIRATION 15 hrs.

Types of feeding – particulate and liquid – digestion and absorption of carbohydrate – protein and fat – functions of minerals and vitamins – cellulose digestion in ruminants – respiratory organs – respiratory pigments – oxygen and carbon-di-oxide transport – respiratory quotient – respiratory control.

UNIT II: THERMOREGULATION, OSMOREGULATION AND EXCRETION 15 hrs.

Poikilotherms and homeotherms – physiological adaptations – thermostat – hibernation and aestivation – osmoconformers and osmoregulators with specific examples – osmotic and ionic balance – acid-base balance – structure and function of various excretory organs.

UNIT III: CIRCULATION 12 hrs.

Blood composition – coagulation – types of heart – pulmonary and systemic circulation – cardiovascular regulation – pace maker.

UNIT IV: NEUROSENSORY MECHANISMS 18 hrs.

Structure of neuron – synapse – neuromuscular junction – mechanism of impulse conduction – chemical transmitters – acetylcholine – adrenaline – mechano – photo and chemoreceptors and their physiology – effectors: ultra-structure of skeletal muscle and mechanism of muscle contraction.

UNIT V: ENDOCRINE MECHANISMS 15 hrs.

Hormones in crustaceans and insects – hormones in color change in reptiles – hormones in metabolism and reproduction in mammals.

TEXT BOOK(S):

Nielson S.K, (1990). *Physiology*, (5th ed.), New York: Cambridge press, Print.

REFERENCE BOOK(S):

Eckert R. and Randall D., (1987). *Animal Physiology*, (2nd ed.), New York: CBS publishers and distributors, Print.

Hoar W.S., (1967). *General and Comparative Animal Physiology*, New Delhi, India: Prentice Hall, Print.

Strand F.L., (1983). *Physiology – A regulatory Approach System*, Meerut, India: Macmillan publishing company, Print.

ZOO3206CP LAB IN PHYSIOLOGY AND ENVIRONMENTAL BIOLOGY

(LAB)

LEARNING OUTCOME 4 hrs. / wk.

On successful completion of the course, the student will be able to

- develop practical knowledge about physiological processes in vertebrates
- identify and compare the functioning of various receptors
- evaluate the physical and chemical parameters of an aquatic environment

COURSE CONTENT:

EXPERIMENTS / LAB: 60 hrs.

PHYSIOLOGY

1. Effect of temperature on the opercula activity of fresh water fish
2. Plasticity of pulse rate and heart beat in human.
3. Analysis of nitrogenous wastes in fish and mammal.
4. Uric acid crystal mounting.
5. Study of sensory receptors – mechano, olfactory and photoreceptors.

ENVIRONMENTAL BIOLOGY

6. Study of physical factors – temperature, humidity, light, wind velocity, water current, soil profile, substrate analysis.
7. Analysis of water quality – pH, CO_2, O_2, phosphate, salinity and alkalinity in water samples.
8. Measurement of primary productivity – light and dark bottle method
9. Estimation of biological oxygen demand
10. Analysis of fresh water plankton
11. Study of ecological succession – quadrate analysis

REFERENCE BOOK(S):

Alison L.B., (1971). *Ecology of Fresh Water*, London: Heimemamm Educational books Ltd., Print.

Charles K.S., (1961). *Animal Ecology*, USA: Prentice Cliffs, N.J, Print.

Eugene P.O., (1971). *Fundamentals of Ecology*, (3rd ed.), USA: W.B. Saunderscom. Ltd., Print.

Hoar W.S, (1967). *A Laboratory Companion, General and Comparative Physiology*, New Delhi: Prentice Hall, Print.

Jeyaraj N., and Mahadevan A., (1994). *Animal Physiology Manual*, Tamil Nadu: Arte Publishers, Print.

Michael.P, (1984). *Ecological Methods for Field and Laboratory Investigations*, New Delhi: Tata McGraw Hill publishing company Ltd., Print.

Rastogi, S.C., (1982). *Experimental Physiology*, New Delhi: Wiley Eastern Ltd., Print.

Nielson S.K, (1990). *Physiology*, (5th ed.), New York: Cambridge press, Print.

Hill, Richard W., Gordon A. Wyse, and Margaret Anderson. (2008) *Animal Physiology*. Sunderland, MA: Sinauer Associates.

ZOO4505CM MOLECULAR BIOLOGY

(THEORY)

LEARNING OUTCOME 5 hrs./wk.

On successful completion of the course, the student will be able to

- identify molecular interactions in gene expression and control
- relate genes to functions at molecular level
- apply the concepts learnt for research

COURSE CONTENT:

UNIT I: CHROMOSOME STRUCTURE AND TRANSPOSABLE ELEMENTS 16 hrs.

Structure and organization – bacteria and eukaryotic chromosomes – chromatin, histones, centromere and telomere – gene structure and architecture: introns and exons – repetitive DNA – restriction mapping – gene duplication – pseudogenes – transposable elements: mechanism of transposition – transposable elements in bacteria and eukaryotes – transposition *via* DNA and RNA intermediates.

UNIT II: DNA – MUTATION, REPAIR, REPLICATION AND RECOMBINATION 16 hrs.

DNA as genetic material – Griffith experiment - Hershey and Chase experiment – central Dogma of Molecular Biology – DNA mutation – mutagens and mode of action – types of DNA repair DNA repair mechanisms – semi-conservative replication – enzymes and proteins – prokaryotic and eukaryotic replication – replication models – recombination models and enzymes involved in recombination.

UNIT III: TRANSCRIPTION AND REGULATION OF GENE EXPRESSION 18 hrs.

Transcription apparatus – process of bacterial and eukaryotic transcription – RNA processing: Pre-mRNA – polyadenylation – capping – splicing – editing – Operon: structure – inducible and repressible operons – Lac operon – Trp operon – Attenuation – regulation in eukaryotes: methylation – histone modification – role of activators – enhancers.

UNIT IV: TRANSLATION 15 hrs.

Genetic code: degeneracy – reading frame – mechanism of translation – post-translational modification of proteins.

UNIT V: SIGNAL TRANSDUCTION 10 hrs.

Receptors – signaling pathways – types – G protein-coupled receptor – protein tyrosine kinase – second messengers – intracellular enzyme cascade.

TEXT BOOK(S):

Alberts B, Johnson A, Lewis J, Raff M, Roberts K, and Walter P., (2014). *Molecular Biology of the Cell*, (6th ed.), UK: Garland Science Publishers, Print.

REFERENCE BOOK(S):

Twyman R.M., (1998). *Advanced Molecular Biology*, (4th ed.), New Delhi: Viva books Pvt. Ltd. Print.

Brown T.A., (2007). *Genomes 3*, (3rd ed.), UK: Garland Science Publishers. Print.

Cooper G.M., (1997). *The Cell –Molecular Approach*, Washington DC: ASM Press. Print.

Marks F., Klingmuller U., and Decker, K.M., (2009). *Cellular Signal Processing*, USA: Garland Science, Taylor & Francis Group LLC. Print.

Watson J.D., Baker T.A., Bell S.P., Gann A., Levine M., and Losick R., (2004). *Molecular Biology of the Gene*, (5th ed.), USA: Pearson Education Inc. Print.

ZOO4506CM GENETICS

(THEORY)

LEARNING OUTCOME 5 hrs./wk.

On successful completion of the course, the student will be able to

- interpret the basic principles of heredity
- demonstrate the application of genetics in animal and plant breeding
- relate principles of heredity to various genetic disorders in man and animals

COURSE CONTENT:

UNIT I: MENDEL'S WORK, DEVIATIONS AND SEX DETERMINATION 15 hrs.

Review of Mendel's work: mono and dihybrid ratios – modified Mendelian monohybrid and dihybrid ratios – linkage and crossing over – mapping of chromosomes – sex determination: bipotential nature of organisms – role of external and internal environments – chromosomal mechanism – gynandromorphism.

UNIT II: QUANTITATIVE GENETICS, SEX LINKED INHERITANCE AND CYTOPLASMIC 18 hrs.

Polygenic inheritance: skin pigmentation in man – height and weight in man – ear length in maize/ wheat – spotting in mice – multiple alleles: blood grouping in man – coat colour in rabbits and eye colour in *Drosophila* – related problems – sex-linked inheritance in man (colour blindness and hemophilia) and *Drosophila* (eye colour) – problems – extra nuclear or cytoplasmic inheritance: coiling of shell – kappa particles – milk factor and plastid inheritance.

UNIT III: HUMAN GENETICS 13 hrs.

Simple Mendelian traits – pedigree analysis – study on twins – nature *Vs* nurture – eugenics and genetic counseling – epigenetics.

UNIT IV: POPULATION GENETICS & APPLIED GENETICS 13 hrs.

Hardy-Weinberg theorem – derivation – factors affecting gene frequencies – application of Genetics in animal and plant breeding – problems.

UNIT V: GENETIC BASIS OF DISEASES 16 hrs.

One-gene-one-enzyme concept – mutation – inborn errors of metabolism – hereditary diseases – their mode of inheritance (autosomal dominant – autosomal recessive – x-linked – y-linked) – chromosomal aberrations (structural and numerical) – ploidy.

TEXT BOOK(S):

Pierce B.A., (2012). *Genetics – A Conceptual Approach*, (4th ed.), New York: W.H. Freeman and Co., Print.

REFERENCE BOOK(S):

Tamrin R.H., (2007). *Principles of Genetics*, (7th ed.), India: Tata McGraw Hill Pub., Print.

Gardner E., (1975). *Principles of Genetics*, (5th ed.), India: John Wiley and sons Inc. Print.

Griffiths A.J.F., Wessler S.R., Carroll S.B. and Doebley J., (2012). *Introduction to Genetic Analysis*, New York: W.H. Freeman & Company, Print.

Klug W.S and Cumming M.R, (2003). *Essentials of Genetics*, (7th ed.), New Delhi, India: Replica Press Pvt. Ltd., Print.

Sinnot E.W, Dunn L.C. and Dobzhansky T., (2004). *Principles of Genetics*, (5th ed. Reprint), New Delhi: Tata McGraw Hill Pub. Co. Ltd., Print.

Strickberger W., (1978). *Genetics*, (2nd ed.), London: Macmillan Pub. Co. Inc., Print.

Winchester A.M., (1976). *Genetics*, (3rd ed.), New Delhi: Oxford and IBH Pub. Co., Print.

ZOO4203CP LAB IN GENETICS

(LAB)

LEARNING OUTCOME 3 hrs./ wk.

On successful completion of the course, the student will be able to

- apply genetic principles in understanding modern Molecular Biology
- design experiments pertaining to Mendelian genetics
- construct pedigree trees and use them to solve problems

COURSE CONTENT:

EXPERIMENTS / LAB: 45 hrs.

1. Culture of *Drosophila*
2. Study of *Drosophila* – Isolation of virgin flies, life cycle and observation of giant chromosomes
3. Simple Mendelian traits and pedigree analysis
4. Multiple alleles – blood grouping
5. Multiple alleles – Inheritance of eye color in *Drosophila*
6. Observation of Barr body
7. Polygenic inheritance – height and weight in humans
8. Physical mutagenesis (UV) and survival curve – Bacterial culture
9. Testing of the Hardy-Weinberg equilibrium

REFERENCE BOOK(S):

Jayaram K. and Jayaraman R., (1979). *Laboratory Manual in Molecular Genetics*, New Delhi: Wiley Eastern Ltd., Print.

Jayaraman K. and Krishnaswamy S., (1973). *Genetics – Experiments with Drosophila*, Madurai: Printed at Galaxy, Print.

Sinnot E.W., Dunn L.C. and Dobzhansky T., (1990). *Principles of Genetics*, (5th ed.), New Delhi: Tata McGraw Hill Pub. Co. Ltd., Print.

Winchester A.M., (1976). *Genetics*, (3rd ed.), Kolkata: Oxford and IBH Pub. Co., Print.

ZOO4303CP LAB IN MOLECULAR BIOLOGY AND IMMUNOLOGY

(LAB)

LEARNING OUTCOME 5 hrs. / wk.

On successful completion of the course, the student will be able to

- relate the principles of molecular interactions in different techniques
- design experiments for research and diagnostics
- interpret the reports of molecular and immunological techniques

COURSE CONTENT:

EXPERIMENTS / LAB: 75 hrs.

Review: Safety precautions in Molecular Biology and Immunology lab.

1. Isolation of genomic DNA from mammalian tissue
2. Isolation of RNA from Mammalian tissue
3. Estimation of DNA by DPA method
4. Electrophoretic separation of DNA and RNA.
5. Determination of Tm value of isolated DNA.
6. Study of lymphoid organs in chick/ mice – Demonstration
7. Isolation of T and B lymphocytes and identification by E-Rosette method
8. Raising polyclonal antibodies in fish to antigen BSA/ SRBC (Group work)
9. Immunoassay – Single radial immunodiffusion
10. ELISA – Demonstration

REFERENCE BOOK(S):

Hudson L. and Hay F.C., (1989). *Practical Immunology*, (3rd ed.), London: Blackwell Publishing, Print.

Mehra N.K. and Gupta S.K., (1992). *A Handbook of practical and clinical Immunology*, (2nd ed.), 3 vol., New Delhi: CBS Publishers, Print.

Stites D.P. and Terr A.I, (1991). *Basic clinical Immunology*, (7th ed.), UK: Prentice – Hall International Ltd., Print.

Talwar G.P. and Gupta S.K., (1992). *A Handbook of practical and clinical Immunology*, (2nd ed.), New Delhi: CBS Publishers, Print.

Miller J.H., (1992). *A short course in Bacterial Genetics – Laboratory manual*, U.S.A.: Cold Spring Harbour laboratory press, Print.

Sambrook J., Fritsch E.F and Maniatis T., (1989). *Molecular cloning- A laboratory manual*, (2nd ed.), New York: CSH publishers, Print.

Boyer R., (2000). *Modern Experimental Biochemistry*, (3rd ed.), Portland: Pearson Education Inc., Print.

Palanivelu P., (2004). *Analytical Biochemistry and Separation Techniques – A laboratory manual for B.Sc. and M.Sc. students*, (3rd ed.), Madurai: Kalaimani Printers, Print.

Plummer T.D., (1990). *An Introduction to Practical Biochemistry*, (4th ed.), Europe: McGraw Hill Book Company, Print.

Sawhney S.K., and Singh R., (2001). *Introductory Practical Biochemistry*, New Delhi: Narosa Publishing House, Print.

ZOO5202CP LAB IN GENETIC ENGINEERING

(LAB)

LEARNING OUTCOME 4 hrs./wk.

On successful completion of the course, the student will be able to

- relate the basic principles of genetic engineering in biological research
- plan suitable techniques in biotechnology
- employ electrophoretic and cloning techniques

COURSE CONTENT:

EXPERIMENTS / LAB: 60 hrs.

1. Isolation of plasmid DNA from bacterial cells
2. Isolation of genomic DNA from bacterial cells
3. Electrophoretic separation of DNA
4. Elution and confirmation of DNA
5. Hybridization Techniques –Western blotting
6. Competent cell preparation, Transformation and selection
7. Polymerase Chain Reaction
8. Restriction analysis of DNA

REFERENCE BOOK(S):

Glover D.M. and Hames B.D., (2006). *DNA Cloning*, (2nd ed. & Vol. I, II, III), New York: IRL press at Oxford University Press, Print.

Miller J.H., (1972). *Molecular Genetics*, New York: Cold Spring Harbour, Print.

Sam brook J., Fritsh E.F. and Maniatis T., (2001). *Molecular Cloning*, (3rd ed., & 3 volumes), New York: Cold Spring Harbour Laboratory, Print.

ZOO6302CP LAB IN PLANT AND ANIMAL BIOTECHNOLOGY

(LAB)

LEARNING OUTCOME 5 hrs. / wk.

On successful completion of the course, the student will be able to

- set-up tissue culture lab
- interpret chromosome plates
- apply the techniques for field experimentation

COURSE CONTENT:

EXPERIMENTS / LAB: 75 hrs.

1. Media preparation – MS media and McCoy's 5a
2. Establishment of plant tissue culture from isolated explants
3. Callogenesis, caulogenesis and rhizogenesis
4. Immobilization of cells – synthetic seed
5. Protoplast isolation
6. Primary cell culture – lymphocytes
7. Karyotyping using lymphocyte culture
8. Cell viability and cell counting
9. Preservation of cells and cultures

REFERENCE BOOK(S):

Lindsey K., (2007). *Plant Tissue Culture – Manual*, New Delhi, India: Springer, Pvt. Ltd., Print.

Freshney R.I., (2006). *Culture of Animal Cells – A Manual of Basic Techniques*, (5th ed.), Asia: John Wiley and Sons Pvt. Ltd., Print.

Razdan M.K., (1994). *An Introduction to Plant Tissue Culture,* New Delhi: Oxford & IBH Publishing Co. Pvt. Ltd., Print.

Dubey R.C., (2004). *A Textbook of Biotechnology*, New Delhi: S. Chand & Co. Pvt. Ltd., Print.

(For the following course, content remains the same but the course has been shifted to a different semester and the content is presented in this Academic Council booklet)

ZOO3401CT DEVELOPMENTAL BIOLOGY

(LAB CUM THEORY)

LEARNING OUTCOME 3T + 1L hrs./wk.

On successful completion of the course, the student will be able to

- understand the early pattern of development of an animal.
- correlate the dynamic processes of cell movement to organogenesis.
- compare the various principles and processes of development and differentiation in some representative animal groups.

COURSE CONTENT:

UNIT I: GAMETOGENESIS 9T hrs.

Spermatogenesis, spermiogenesis- differentiation of spermatozoa, oogenesis, types of sperm and ova, Fertilization-approach of sperm to the egg- Activation of egg - Cortical reaction - fertilization membrane - changes in organization of egg.

UNIT II: CLEAVAGE AND GASTRULATION 9T + 2L hrs.

Patterns of cleavage – fatemaps and gastrulation in frog and chick.
LAB: Chick embryo – 24 hrs., 48 hrs., 72 hrs. and 96 hrs. – Observation of live chick embryo – Blastoderm mounting.

UNIT III: ORGANOGENESIS 9T hrs.

Development of eye and heart in frog; Organizer – with experimental evidences.

UNIT IV: MAMMALIAN EMBRYOLOGY 9T + 3L hrs.

Placentation, types of placenta, physiology - deciduous, non-deciduous; Developmental stages - changes during gestation, parturition - *in vitro* fertilization – test tube babies. Teratology - definition,

malformation in legs, arms, hands and feet, drug - induced malformation. LAB: T.S. of mammalian ovary, T.S. of chick ovary, T.S. of mammalian testis. Yolk sac placenta, polyembryony (Armadillo)

UNIT V: METAMORPHOSIS 9T + 10L hrs.

Metamorphosis in amphibia, insects and their hormonal regulation - thyroid hormones, ecdysone and juvenile hormone. Histological and physiological processes involved in limb regeneration. LAB: Observation of frog development and tadpole tail regeneration.

TEXT BOOK(S):

Balinsky, B.I., (2001). *An Introduction to Embryology*, (5th ed.), Philadelphia, London: Holt – Saunders International. Print.

Carlson, B.M., (1998). *Patten's Foundation of Embryology*, (5th ed.), London: McGraw Hill Inc. Print.

REFERENCE BOOK(S):

Berril, N.J., (1980). *Developmental Biology*, New Delhi: Tata McGraw Hill Pub. Company Ltd. Print.

Bradley, P.M., (1925). *The Early Embryology of the Chick*, (3rd ed.), Toronto, The Blakiston Company. Print.

Browder, L.W., Erickson, C.A., and Jeffery, W.R., (1991). *Developmental Biology*, (3rd ed.), London: Saunder College Pub., Print.

Gilbert, S.F., (2006). *Developmental Biology*, (8th ed.), Sunderland, Massachusetts: Sinauer Associates Inc., Print.

COURSE PROFILE

M.Sc. ZOOLOGY (SPECIALIZATION IN BIOTECHNOLOGY)

From 2019 batch onwards

Sem.	Course Code	Course Title	Course Type	Hrs./Wk.		Credits	Passed in Academic Council	Offered to	Offered by
				TH	LA				
I	PGZ1527M	PHYSIOLOGY	TH	5		5	AV 2014	APZOO	ZOO
	PGZ1528M	BIOCHEMISTRY	TH	5		5	AV 2014	APZOO	ZOO
	PGZ1530M	MICROBIOLOGY	TH	5		5		APZOO	ZOO
	PGZ1423P	LAB IN MICROBIOLOGY	LA		5	4	AV 2014	APZOO	ZOO
	PGZ1424P	LAB IN PHYSIOLOGY AND BIOCHEMISTRY	LA		5	4	AV 2014	APZOO	ZOO
	PGV1101PV	FOUNDATION COURSE ON WOMEN'S STUDIES	TH	2		1	AV2014 as PGV0113V	NON LDC ALLM	Centre for VE
	PGV1102PV	PERSPECTIVES ON GENDER					AV2014 as PGV2101V	LDC ALLM	
	PIV1102PI	THE BIBLE AND SCIENCE						APCH/ SPCH	
		LIBRARY		2					
		CLUB		1					