

SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben
Jivanlal College of Commerce & Economics (AUTONOMOUS)



Shri Vile Parle Kelavani Mandal's
**MITHIBAI COLLEGE OF ARTS, CHAUHAN INSTITUTE OF SCIENCE & AMRUTBE
JIVANLAL COLLEGE OF COMMERCE AND ECONOMICS (AUTONOMOUS)**
*NAAC Reaccredited 'A' grade, CGPA: 3.57 (February 2016),
Granted under RUSA, FIST-DST & -Star College Scheme of DBT, Government of India,
Best College (2016-17), University of Mumbai*

Affiliated to the
UNIVERSITY OF MUMBAI

Program: B.Sc.

Course: USMAZO501

Semester V

**Choice Based Credit System (CBCS) with effect from the
Academic year 2018-19**

PROGRAMME SPECIFIC OUTCOMES (PSO'S)

On completion of the B.Sc.- ZOOLOGY, the learners should be enriched with knowledge and be able to-

- PSO1:** _____
- PSO2:** _____
- PSO3:** _____
- PSO4:** _____
- PSO5:** _____
- PSO6:** _____
- PSO7:** _____
- PSO8:** _____

Preamble

Zoology has emerged as a progressive subject in the last decade with innovations in curricular designing and unique initiatives which attracted students, both from urban as well as rural colleges, in large numbers towards this subject. The fundamental challenge however, was to design curricula without dissections, the backbone of the subject. We Zoologists though are firmly against cruelty to animals and practice conservation, had to take it with a pinch of salt that the dead table fish from the market and pests were also banned for dissection. Use of ICT and simulation techniques is strongly recommended to replace the dissections using animals by virtual dissection.

Students may present a research project under the guidance of a teacher from their college or any other college or from the industry or may do so on their own which shall be evaluated by the examiners at the time of the practical examinations and that the performance shall be considered separately as additional optional credits, based on the free choice of student and if permitted by the authorities then the same could be transferred to the other / higher programs if desired.

Care has also been taken to include a unit on muscles which was much neglected so far in anatomy. Possibility cannot be ruled out that it may give further impetus to Zoology students to enter the career of Gym and Fitness. This niche of students shall have upper hand over other personnel in the fitness industry in passing international exams since they already have knowledge of physiology to a desired extent.

This syllabus is framed by incorporating inputs from all the members who represented teachers, students, rank holders, people from the industry and interdisciplinary background, scientists from India and abroad.

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Evaluation Pattern

The performance of the learner will be evaluated in two components. The first component will be a Continuous Assessment with a weightage of 25% of total marks per course. The second component will be a Semester end Examination with a weightage of 75% of the total marks per course. The allocation of marks for the Continuous Assessment and Semester end Examinations is as shown below:

a) Details of Continuous Assessment (CA)

25% of the total marks per course:

Continuous Assessment	Details	Marks
Component 1 (CA-1)	Test/Assignment/Tutorial/ Visit/Project/ Presentation	15 marks
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b) Details of Semester End Examination

75% of the total marks per course. Duration of examination will be two and half hours.

Question Number	Description	Marks	Total Marks
Total Marks			75

Signature

Signature

Signature

HOD

Approved by Vice –Principal

Approved by Principal

1.3: Coelom

1.3.1: Basic concept and definition

1.3.2: Formation of coelom

1.3.3: Types:

- a. Acoelomate: Platyhelminthes e.g. Liverfluke
- b. Pseudocoelomate: Nematoda e.g. *Ascaris*
- c. Coelomate: e.g. Frog

1.3.4: Evolutionary significance of coelom

1.4: Metamerism

1.4.1: Basic concept and definition

1.4.2: Types:

- a. Pseudometamerism: e.g., Tapeworm
- b. True metamerism:
 - i. Homonomous – Annelida e.g., *Nereis*
 - ii. Heteronomous- Cephalization – Insecta

e.g., Dragonfly

Cephalothorax – Crustacean e.g. Lobster

1.4.3: Evolutionary significance of metamerism

1.5: Taxonomy

1.5.1: Basic concept, definition and objectives

1.5.2: Linnaean Hierarchy, Binomial Nomenclature

1.5.3: Six Kingdom classification:

General characters of each Kingdom with examples:

- Kingdom Archaeobacteria
- Kingdom Eubacteria
- Kingdom Protista
- Kingdom Fungi
- Kingdom Plantae
- Kingdom Animalia

1.6: Kingdom Protista: Animal like Protists: Protozoa

1.6.1: General characters of Protozoa

1.6.2: Classification of Protozoa with distinguishing features and suitable examples:

- Phylum Sarcomastigophora

	<ul style="list-style-type: none"> ➤ Class Sarcodina e.g. <i>Amoeba</i> ➤ Class Mastigophora e.g. <i>Trypanosoma</i> • Phylum Ciliophora <ul style="list-style-type: none"> ➤ Class Ciliata e.g. <i>Opalina</i> ➤ Class Phyllopharyngea e.g. <i>Dysteria</i> • Phylum Sporozoa <ul style="list-style-type: none"> ➤ Class Aconoidasida e.g. <i>Plasmodium</i> ➤ Class Conoidasida e.g. <i>Toxoplasma</i> 	
2	<p><u>Kingdom Animalia I</u></p> <p>2.1: Phylum Porifera</p> <p>a. General characters</p> <p>b. Classification up to class with distinguishing features and suitable examples:</p> <ul style="list-style-type: none"> • Class Calcarea e.g. <i>Leucosolenia</i> • Class Hexactinellida e.g. <i>Hyalonema</i> (Glass-rope sponge) • Class Demospongia e.g. <i>Euspongia</i> (Bath sponge) <p>2.2: Phylum Cnidaria</p> <p>a. General characters</p> <p>b. Classification up to class with distinguishing features and examples</p> <ul style="list-style-type: none"> • Class Hydrozoa e.g. <i>Hydra</i> • Class Scyphozoa e.g. <i>Aurelia</i> (Jelly fish) • Class Anthozoa e.g. <i>Meandrina</i> (Maze Coral) <p>2.3: Phylum Platyhelminthes</p> <p>a. General characters</p> <p>b. Classification up to class with distinguishing features and examples</p> <ul style="list-style-type: none"> • Class Turbellaria e.g. <i>Planaria</i> • Class Trematoda e.g. <i>Schistosoma</i> (Blood-fluke) • Class Cestoda e.g. <i>Taenia sp.</i> (Tapeworm) <p>c. Morphology, life cycle and pathogenicity of <i>Fasciola sp.</i></p> <p>2.4: Phylum Nematoda</p> <p>a. General characters</p> <p>b. Classification up to class with distinguishing features and examples</p> <ul style="list-style-type: none"> • Class: Aphasmda / Adenophorea e.g. <i>Trichinella</i> (Trichina worm) • Class: Phasmida / Secernentea e.g. <i>Ascaris</i> (Roundworm) 	15
3	<p><u>Kingdom Animalia II</u></p> <p>3.1: Phylum Annelida</p> <p>3.1.1: General characters</p> <p>3.1.2: Classification up to class with distinguishing features and examples</p> <ul style="list-style-type: none"> • Class Polychaeta e.g. <i>Neries</i> (Clamworm) • Class Oligochaeta e.g. <i>Pheretima</i> (Earthworm) • Class Hirudinea e.g. <i>Hirudinaria</i> (Leech) 	15

3.2: Phylum Arthropoda

3.2.1: General characters

3.2.2: Classification up to class with distinguishing features and examples

- Subphylum Chelicerata
 - Class Arachnida e.g. *Hottentotta tamulus* (Indian Red Scorpion)
 - Class Merostomata e.g. *Limulus* (Horse-shoe crab)
 - Class Pycnogonida e.g. *Nymphon* (Sea spider) □ Subphylum Crustacea
 - Class Malacostraca e.g. *Scylla serrata* (Giant Mud Crab)
 - Class Maxillipoda e.g. *Balanus* (Barnacle)
- Subphylum Uniramia
 - Class Chilopoda e.g. *Scolopendra* (Centipede)
 - Class Diplopoda e.g. *Xenobolus* (Millipede)
 - Class Insecta e.g. *Attacus atlas* (Atlas moth)

3.3: Phylum Mollusca

3.3.1: General characters of the Phylum.

3.3.2: Classification up to class with distinguishing features and examples

- Class Aplacophora e.g. *Chaetoderma*
- Class Polyplacophora e.g. *Chiton* (Coat-of-mail shells)
- Class Monoplacophora e.g. *Neopilina*
- Class Gastropoda e.g. *Nerita* (Nerit)
- Class Pelecypoda e.g. *Solen* (Razor clam)
- Class Scaphopoda e.g. *Dentalium* (Tusk shell)
- Class Cephalopoda e.g. *Nautilus* (Pearly nautilus)

3.4: Phylum Echinodermata

3.4.1 General characters

3.4.2 Classification up to class with distinguishing features and examples

- Class Asterozoa e.g. *Protoreaster* (Starfish)
- Class Ophiurozoa e.g. *Ophiothrix* (Brittle star)
- Class Echinozoa e.g. *Clypeaster* (Sand dollar)
- Class Holothurozoa e.g. *Cucumaria* (Sea cucumber)
- Class Crinozoa e.g. *Antedon* (Sea lily)

3.5 Minor phyla

3.5.1: General characters along with examples of

- Phylum Acanthocephala e.g. *Moniliformis*
- Phylum Onychophora e.g. *Peripatus* (Velvet worm)
- Phylum Chaetognatha e.g. *Sagitta* (Arrow worm)

. 5.2: *Peripatus*, a connecting link

	<p>3.6 Phylum Hemichordata 3.6.1: General characters and classification with distinguishing features and examples</p> <ul style="list-style-type: none"> • Class Enteropneusta e.g. <i>Balanoglossus</i> (Acorn worm) • Class Pterobranchia e.g. <i>Rhabdopleura</i> • Class Planctosphaeroidea e.g. <i>Planctosphaera</i> <p>3.7 Basic concepts of phylogeny: Phylogenetic tree of invertebrates</p>	
4	<p><u>Type study: Sepia</u> 4.1: General characters and classification, Habit and habitat, External characters, mantle cavity, locomotion, economic importance</p> <p>4.2: Digestive system, Respiratory system, Circulatory system, Excretory system, Nervous system and Sense organs, Reproductive system</p>	15
	Total	60
PRACTICALS		
<p>1. Classification of phyla up to class and study of the general characters up to class.</p> <p>Kingdom Protista – Animal-like Protists: Protozoa</p> <p>A. Phylum: Sarcomastigophora</p> <ul style="list-style-type: none"> • Class Sarcodina e.g. <i>Amoeba</i> • Class Mastigophora e.g. <i>Euglena</i> <p>B. Phylum: Ciliophora</p> <ul style="list-style-type: none"> • Class Ciliata e.g. <i>Paramecium</i> • Class Phyllopharyngea e.g. <i>Dysteria</i> <p>C. Phylum: Apicomplexa / Sporozoa,</p> <ul style="list-style-type: none"> • Class Aconoidasida e.g. <i>Eimeria</i> • Class Conoidasida e.g. <i>Sarcocystis</i> <p>Kingdom Animalia</p> <p>D. Phylum: Porifera</p> <ul style="list-style-type: none"> • Class Calcarea e.g. <i>Scypha</i> • Class Hexactinellida e.g. <i>Hyalonemma</i> • Class Demospongia e.g. <i>Spongilla</i> <p>E. Phylum Cnidaria</p> <ul style="list-style-type: none"> • Class Hydrozoa e.g. <i>Vellela</i> • Class Scyphozoa e.g. <i>Rhizostoma</i> • Class Anthozoa e.g. <i>Corallium</i> <p>F. Phylum Platyhelminthes</p> <ul style="list-style-type: none"> • Class Turbellaria e.g. <i>Dugesia tigrina</i> • Class Trematoda e.g. <i>Fasciola hepatica</i> • Class Cestoda e.g. <i>Taenia solium</i> 		

G. Phylum Nematoda

- Class Aphasmida / Adenophorea e.g. *Trichinella*
- Class Phasmida / Secernentea e.g. *Ascaris*

H. Phylum Annelida

- Class Polychaeta e.g. *Arenicola*
- Class Oligochaeta e.g. *Tubifex*
- Class Hirudinea e.g. *Pontobdella*

I. Phylum Arthropoda

Subphylum Chelicerata

- Class Arachnida e.g. (Scorpion)
- Class Merostomata e.g. *Limulus*
- Class Pycnogonida e.g. (Sea spider)

Subphylum Crustacea

- Class Malacostraca e.g. Lobster
- Class Maxillipoda e.g. Copepods

Subphylum Uniramia

- Class Chilopoda e.g. Centipedes
- Class Diplopoda e.g. Millipedes
- Class Insecta e.g. Moth

J. Phylum Mollusca

- Class Aplacophora e.g. *Chaetoderma*
- Class Polyplacophora e.g. *Tonicella*
- Class Monoplacophora e.g. *Neopilina*
- Class Gastropoda e.g. *Turbo*
- Class Pelycypoda e.g. *Donax*
- Class Scaphopoda e.g. *Dentalium*
- Class Cephalopoda e.g. *Octopus*

K. Phylum Echinodermata

- Class Asteroidea e.g. Starfish
- Class Ophiuroidea e.g. Brittle star
- Class Echinoidea e.g. *Echinus* (Sea urchin)
- Class Holothuroidea e.g. *Holothuria* (Sea cucumber)
- Class Crinoidea e.g. Crinoid (Sea lily)

L. Phylum Hemichordata

- Class Enteropneusta e.g. *Saccoglossus*
- Class Pterobranchia e.g. *Rhabdopleura*
- Class Planctosphaeroidea e.g. *Planctosphaera*

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2. Minor Phyla

Acoelomate

M. Phylum Acanthocephala e.g. *Echinorhynchus*

Coelomate

N. Phylum Chaetognatha e.g. *Sagitta*

O. Phylum Onychophora e.g. *Peripatus*

3. Study of Sepia with the help of diagram / Photograph / Simulation whichever possible. No animal shall be dissected.

- a) Digestive system,
- b) Reproductive system
- c) Nervous system
- d) Jaws
- e) Radula
- f) Chromatophores
- g) Spermatophores
- h) Statocyst

4. Study tour – Visit to fish market / Aquarium / Any other place to observe invertebrates and submit a report.

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Unit	Topic	No. of Hours/Credits
Module 1	Principles of Taxonomy	15
Module 2	Kingdom: Animalia I	15
Module 3	Kingdom: Animalia II	15
Module 4	Type study: <i>Sepia</i>	15

To develop scientific temper and interest by exposure through industrial visits and study/educational tours is recommended in each semester

PRACTICAL I

Unit	Topic	No. of Hours/Credits
	Zoology Practical-I	1.5 credits

Suggested Readings

1. Invertebrate Zoology: E.L. Jordan and P.S. Verma
2. A manual of Zoology - Part I, Invertebrata; Ayyar, M. Ekambaranath □ Invertebrate Zoology – Volumes of different Phyla; Hyman L.H.
3. Instant Notes in Animal Biology by Richard D. Jurd.
4. Zoology For Degree Students: Dr. V. K. Agarwal, S. Chand publication.
5. Introduction to Zoology – Vol I: K. K. Chaki, G. Kundu and S. Sarkar, New Crystal Book Agency.
6. Modern text book of Zoology – Invertebrates; Eleventh; Edition Professor R. L. Kotpal; Rastogi publication
7. Phylum Sarcomastigophora viz. Protozoology, by S. V. Nikam & S. T. Tanveer; ed. 2011, Pub. Oxford Book.

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8. Invertebrate Zoology by E. L. Jordan & P. S. Verma Rev. edition, 2009, Chand publications □
Invertebrate Zoology by P. S. Verma, edition, 2009, Chand publications
9. Zoology for degree students, Non chordates-1 by V.K. Agarwal 2017, S. Chand publications
10. Zoology for Degree Students-I, B.Sc. First Year, by V. K. Agarwal, Pub. S. Chand Coy.
11. B. Sc. Zoology, Invertebrate Zoology by V. K. Aggarwal 2017, S. Chand publications
Invertebrate Zoology by Fatik Baran 2012, PHI Learning
12. A Textbook of Invertebrates by N.C. Nair et al. 2010 Saras publications
13. Practical Zoology: Invertebrate, by S. S. Lal, 2016
14. Invertebrate Zoology by Ruppert, Fox, Barnes, 7th edition, 2003 publications Cengage Learning
15. Invertebrate Zoology by D.T. Anderson 2nd edition 2002, publications Oxford
16. Invertebrates by Richard C. Brusca et. al, 3rd edition 2016, publications Oxford
17. Biology of the invertebrates by Jan A. Pechenik, 7th edition, 2014 publications McGraw Hill
18. An introduction to the invertebrates by Janet Moore, 2nd edition 2006, publications Cambridge
19. Protozoology, by S. V. Nikam & S. T. Tanveer ed. 2011, Pub. Oxford Book Company (N.B.:
This book includes Phylum Sarcomastigophora)

ADDITIONAL READING

20. <https://www.earthlife.net/inverts/an-phyla.html>
21. <http://www.biologydiscussion.com/invertebrate-zoology/invertebrates-phyla/study-notes-on-invertebrates-phyla/28077>
22. <http://www.asfa.k12.al.us/ourpages/auto/2014/4/23/64232119/invertebrate-animal-phyla-notes.pdf>
23. <http://www.biology-pages.info/I/Invertebrates.html>
24. <https://portals.iucn.org/library/sites/library/files/documents/2012-064.pdf>
25. <http://instruction2.mtsac.edu/mcooper/Biology%202/Labs/Protistalab1.pdf>
26. <http://www.faculty.ucr.edu/~legneref/invertebrate/inverteb.htm>
27. <http://www.cbv.ns.ca/mchs/diversity/ProtozoansPage1.html>
28. http://bioweb.uwlax.edu/bio203/s2009/maiers_andr/Classification.htm
29. <https://www.earthlife.net/inverts/annelida.html>
30. <https://manoa.hawaii.edu/exploringourfluidearth/biological/invertebrates/worms-phylaplatyhelminthes-nematoda-and-annelida>
31. http://www.fossilmuseum.net/Tree_of_Life/PhylumAnnelida.htm
<http://www.austinncc.edu/sziser/Biol%201413/LectureNotes/InexamIII/Phylum%20Annelida.pdf>
32. <http://animaldiversity.org/accounts/Annelida/classification/>
33. <http://faculty.collegeprep.org/~bernie/sciproject/project/Kingdoms/Animal%20Kingdom%20-%205/Local%20copy/classification/arthropoda.html>
34. http://bio.rutgers.edu/~gb102/lab_2/309am-arthro.html
35. <http://www.auburn.edu/academic/classes/biol/1030/boyd/lect10-14outline.htm>
36. http://www.fossilmuseum.net/Tree_of_Life/PhylumArthropoda.htm
37. <http://www.geo.arizona.edu/geo3xx/geo308/FoldersOnServer/2003/3Mollusca.htm>
38. http://www.fossilmuseum.net/Tree_of_Life/PhylumMollusca.htm
39. <http://www.geo.arizona.edu/geo3xx/geo308/FoldersOnServer/2003/Lab7EchinoArthro.htm>
40. <https://www.earthlife.net/inverts/echinodermata.html>
41. <http://www.uky.edu/OtherOrgs/KPS/paleoclass/pages/wimbergechinodermata.htm>
42. http://www.fossilmuseum.net/Tree_of_Life/Phylum-Echinodermata.htm

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Date: 19th October, 2020

To,
Member Secretary,
Academic Council,
Mithibai College (Autonomous),
Vile Parle- West

Subject: Agenda for Academic Council meeting scheduled on _____

Dear Member Secretary,

Kindly include the following agenda for the meeting of Academic Council scheduled for 27th October, 2020.

(Example- Agenda items to be in brief statements)

- i) To approve the format for submission of agenda, notes thereto and curriculum to Academic council
- ii) To confirm/ approve syllabus for _____
- iii) To confirm/ approve-----

Thanking you,

Yours Sincerely,
Head of _____

Recommended by :

Vice-Principal

and Approved by:

I/C Principal

DEPARTMENT OF _____

BOARD OF STUDIES – MEETING

Date - _____ 2020

Time: 2:00 PM

Online on MS Teams

AGENDA

- 1)
- 2)
- 3)
- 4)

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RESOLUTION

At the online Board of Studies - _____ meeting held on _____ at _____ on MS Teams, it was resolved that –

- 1)
- 2)
- 3)
- 4)

S.No.	BOS Members	Signature
1	_____ – Chairperson	
2	Two subject experts outside the parent University: a) b)	
3	Vice-Chancellor -University of Mumbai nominee a)	
4	Representative from Industry a)	
5	Post-graduate meritorious alumnus a)	
6	Members of same faculty - a) b)	
7	Member appointed by Management a)	
8	Faculty members a)	

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	b)	
	c)	
	d)	

MINUTES OF MEETING

S.No.	Agenda Item	Discussion
1.		
2.		
3.		
4.	Any other matter:	



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Program: B.Sc.

Course: USMAZO502

Semester V

**Choice Based Credit System (CBCS) with effect from the
Academic year 2018-19**

PROGRAMME SPECIFIC OUTCOMES (PSO'S)

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Preamble

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Students may present a research project under the guidance of a teacher from their college or any other college or from the industry or may do so on their own which shall be evaluated by the examiners at the time of the practical examinations and that the performance shall be considered separately as additional optional credits, based on the free choice of student and if permitted by the authorities then the same could be transferred to the other / higher programs if desired.

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Signature

Signature

Signature

HOD

Approved by Vice –Principal

Approved by Principal

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Program: B.Sc. (2021-22)				Semester: V	
Course: HAEMATOLOGY, HUMAN GENOME PROJECT AND IMMUNOLOGY				Course Code: USMAZO502	
Teaching Scheme				Evaluation Scheme	
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Continuous Assessment (CA) (Marks - 25)	Semester End Examinations (SEE) (Marks- 75 in Question Paper)
4	4	---	2.5+1.5=4	25	75
Learning Objectives:					
<ul style="list-style-type: none"> • To introduce to the learner the composition of blood, haemorrhage and haematopoiesis • To acquaint the learner with the physiology of blood clotting and clinical aspects of haematology • To acquaint the learners with concept of Human Genome Project highlighting its techniques and applications • To introduce the topic of immunology by emphasizing the basic concepts to build a strong foundation and to give an overview of the immune system that plays an important role in disease resistance. • To introduce immunopathology to the learner • To introduce the concept of vaccines and vaccination. • To familiarize the learner to immunological perspectives of organ transplantation. 					
Course Outcomes:					
After completion of the course, learners would be able to:					
CO1: Comprehend basic haematology.					
CO2: Identify various components of haemostatic systems					
CO3: Get familiar with genetic linkage maps mastering related methodologies and approaches of Human Genome Project (HGP) and their uses.					
CO4: Comprehend the types of immunity and the components of immune system.					
CO5: Realize the significant role of immune system in giving resistance against diseases.					
CO6: Understand immunopathology and the principles and applications of vaccines.					
CO7: Develop basic understanding of immunology of organ transplantation.					
Outline of Syllabus: (per session plan)					
Module	Description				No of Hours
1	<p><u>Basic Haematology</u></p> <p>1.1: Composition of plasma: Water, respiratory gases, dissolved salts, plasma proteins, nutrients, enzymes, hormones, nitrogenous waste products</p> <p>1.2: Haematopoiesis: Erythropoiesis, leucopoiesis and thrombopoiesis</p> <p>1.3: Erythrocytes: Structure and functions, abnormalities in structure, total count, variation in number; ESR; types of anaemia</p> <p>1.4: Haemoglobin: Structure, formation and degradation; variants of haemoglobin (foetal, adult), abnormalities in haemoglobin (Sickle cell and Thalassemia)</p>				15

	<p>1.5: Leucocytes: Types and functions, total count and variation in number; leukaemia and its types</p> <p>1.6: Thrombocytes: Structure, factors and mechanism of clotting, failure of clotting mechanism</p> <p>1.7: Blood volume: Total quantity and regulation; haemorrhage</p>	
<p style="text-align: center;">2</p>	<p><u>The Human Genome Project</u></p> <p>2.1 The Human Genome, Scope and Goals of the Project</p> <p>2.2 Genetic Linkage Maps, Chromosome Walking, Restriction Mapping</p> <p>2.3 Polymorphic DNA Marker</p> <p>2.4 Restriction Fragment Length Polymorphism (RFLP) and its uses</p> <p>2.5 Physical maps, sequence tagged sites</p> <p>2.6 Integrating genetic linkage and physical maps</p> <p>2.7 Mapping human diseases</p> <p>2.8 Positional Cloning: Getting closer to a disease-causing gene</p> <p>2.9 Testing for exons</p> <p>2.10 Limitations of positional cloning</p>	<p style="text-align: center;">15</p>
<p style="text-align: center;">3</p>	<p><u>Basic Immunology</u></p> <p>3.1: Overview of Immunology</p> <p>3.1.1: Concept of immunity</p> <p>3.1.2: Innate immunity – Definition, factors affecting innate immunity, Mechanisms of innate immunity – First line of defence – physical and chemical barriers; Second line of defence- phagocytosis, inflammatory responses and fever</p> <p>3.1.3: Adaptive or Acquired immunity, Antibody mediated and cell mediated immunity; Active Acquired immunity – Natural and Artificial; Passive Acquired immunity – Natural and Artificial</p> <p>3.2: Cells and Organs of immune system</p> <p>3.2.1: Cells of immune system – B cells, T cells and null cells, macrophages, dendritic cells and mast cells</p> <p>3.2.2: Organs of immune system</p> <ul style="list-style-type: none"> • Primary: Thymus and bone marrow • Secondary: Lymph nodes and spleen <p>3.3: Antigens: Definition and properties; haptens</p>	<p style="text-align: center;">15</p>

	<p>3.4: Antibodies: Definition, basic structure, classes of antibodies – IgG, IgA, IgM, IgD and IgE</p> <p>3.5: Antigen processing and presentation</p> <p>3.5.1: Endogenous antigens – cytosolic pathways</p> <p>3.5.2: Exogenous antigens – endocytic pathways</p>	
4	<p><u>Applied Immunology</u></p> <p>4.1: Antigen-Antibody interaction</p> <p>4.1.1: General features of antigen-antibody interaction</p> <p>4.1.2: Precipitation reaction – Definition, characteristics and mechanism.</p> <ul style="list-style-type: none"> • Precipitation in gels (slide test) • Radial immunodiffusion (Mancini method) • Double immunodiffusion (Ouchterlony method) <p>4.1.3: Immunoelectrophoresis – Counter-current and Laurel's Rocket electrophoresis</p> <p>4.1.4: Agglutination reaction definition, characteristics and mechanism.</p> <ul style="list-style-type: none"> • Haemagglutination (slide and micro-tray agglutination) • Passive agglutination • Coomb's test <p>4.1.5: Immunoassay- ELISA</p> <p>4.2: Vaccines and Vaccination</p> <p>4.2.1: Principles of vaccines – active and passive immunization, Routes of vaccine administration</p> <p>4.2.2: Classification of vaccines:</p> <ul style="list-style-type: none"> • Live attenuated • Whole-Killed or inactivated • Sub-unit vaccines: Toxoids, Protein vaccines, Viral-like particles, DNA vaccines <p>4.2.3: Adjuvants used for human vaccines:</p> <ul style="list-style-type: none"> • Virosomes and Liposomes • Saponins • Water-in-oil emulsions <p>4.2.4: Vaccines against human pathogens:</p> <ul style="list-style-type: none"> • Polio • Hepatitis A and B • Tuberculosis (BCG) <p>4.3: Transplantation Immunology: Introduction to transplantation; Types of grafts;</p> <p style="padding-left: 40px;">Immunologic basis of graft rejection: MHC compatibility in organ transplantation, Lymphocyte and Antibody mediated graft rejection; Precautionary measures against graft rejection</p>	15

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Total	60
PRACTICALS <ol style="list-style-type: none">1. Enumeration of Erythrocytes – Total Count.2. Enumeration of Leucocytes – Total Count.3. Differential count of Leucocytes.4. Erythrocyte Sedimentation Rate by suitable method – Westergren or Wintrobe method.5. Estimation of haemoglobin by Sahli's acid haematin method.6. Determination of serum LDH by using colorimeter/ spectrophotometer.7. Estimation of total serum/ plasma proteins by Folin's method.8. Estimation of serum/ plasma total triglycerides by Phosphovanillin method.9. Latex agglutination test – Rheumatoid Arthritis.10. Determination of bleeding and clotting time.11. Observation of Banding Techniques (G Banding and C Banding)	

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Unit	Topic	No. of Hours/Credits
Module 1	Basic Haematology	15
Module 2	Human Genome Project	15
Module 3	Basic Immunology	15
Module 4	Applied Immunology	15

PRACTICAL II

Unit	Topic	No. of Hours/Credits
	Zoology Practical-II	1.5 credits

Suggested Readings

1. Human Physiology - Volume 1; C.C. Chatterjee
2. Essentials of Haematology; Shirish M. Kawthalkar; Jaypee Brothers
3. Williams Hematology; Kenneth Kaushansky, Marshall A. Lichtman, E. Beutler, Thomas J. Kipps, Josef Prchal, Uri Seligsohn
4. Essential Haematology; Victor Hoffbrand, Paul Moss, John Pettit
5. Rapid Review of Hematology; Ramadas Nayak; Jaypee Brothers
6. Precise Haematology; Usha Rusia, Meera Sikka, Renu Saxena; Wiley India
7. Short Textbook of Haematology; Shah B.S.; C.B.S. Publisher and Distributor
8. Practical Zoology; Second Edition; Dr. K.C. Ghose & Dr. B. Manna; New Central Book Agency Pvt. Ltd., Kolkata; 1999
9. Mechanisms of Body Functions; Second Edition; Dexter M. Easton; Prentice-Hall of India Pvt. Ltd., New Delhi; 1978
10. A Text book of Practical Physiology; First Edition; V.G. Ranade; A.V.G. Prakashan, Pune; 1968
11. Principles of Anatomy & Physiology; Thirteenth Edition; Gerard J. Tortora & Bryan Derrickson; Biological Science Textbooks, Inc.; 2012
12. Biochemistry; Fourth Edition; U. Satyanarayana & U. Chakrapani; Elsevier; 2013
13. Concepts in Biochemistry; Third Edition; Rodney Boyer; John Wiley & Sons, Inc.; 2006

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14. Medical Biochemistry; Fourth Edition; John Baynes & Marek Dominiczak; Saunders (Elsevier); 2014
15. Harrison's Hematology and Oncology; 3rd Edition (Harrison's Specialty); Dan Longo; McGraw-Hill
16. Essentials of Haematology; Second Edition; Kawthalkar Shirish M.; Jaypee; 2013
17. Medical Biochemistry by C. Jaypee; 2012
18. Essentials in Hematology and Clinical Pathology; Nayak, Ramadas
19. Clinical Pathology and Hematology; Maheshwari, Nanda; Jaypee Practical Hematology; Dacie J V; Churchill Livingstone; 2006
20. Lecture Notes: Haematology; Hatton, Chris S. R. Hughes-Jones, Nevin C. Hay, Deborah; Wiley-Blackwell ABC series: ABC of Clinical Haematology; Provan; Drew Publisher: BMJ Books
21. Principles of Anatomy & Physiology; Thirteenth Edition; Gerard J. Tortora & Bryan Derrickson; Biological Science Textbooks, Inc.; 2012
22. Biochemistry; Fourth Edition; U. Satyanarayana & U. Chakrapani; Elsevier; 2013
23. Johan E. Smith Biotechnology 3rd edition, Cambridge University Press
24. Colin Rateledge and Bjorn Kristiansen, 'Basic Biotechnology', 2nd Edition, Cambridge University Press
25. David Freifelder 'Molecular Biology' Narosa Publishing House; 2008
26. David Clark 'Molecular Biology – Academic Cell Update' Edition; Elsevier, Inc.; 2010
27. Joseph Sambrook, David William Russell 'Molecular cloning' Third Edition; CSHL Press; 2001
28. Watson, J.D., Myers, R.M., Caudy A., Witkowski, J.K.; Recombinant DNA - Genes and Genomes- A short course; 3rd Edition Freeman and Co. NY; 2007
29. Glick, B.R. and Pasternak, J. J., Molecular Biotechnology - Principles and applications of recombinant DNA; ASM press, Washington; 2010
30. B. D. Singh; Biotechnology – Expanding Horizons; Kalyani Publishers, Ludhiana
31. Tom Strachan and Andrew Read Human Molecular Genetics; Fourth Edition; Garland Science, USA; 2011
32. Susan R. Barnum, Biotechnology – An Introduction, Vikas Publishing House
33. Bernard R. Glick and Jack J. Pasternack, Molecular Biotechnology – Principles and applications of recombinant DNA, ASM Press, Washington DC
34. U. Satyanarayan, Biotechnology, 2007 Reprint, Uppala Author Publisher Interlink
35. Immunology - Introductory Textbook; Shetty N.; New Age International; 2005
36. Immunology - Essential and Fundamental; Pathak S., & Palan U.; Science Publishers; 2005
37. Immunology: A textbook; Rao C. V.; Alpha Science Int'l Ltd.; 2005
38. Ananthanarayan and Paniker's textbook of Microbiology; C. J. Paniker (Ed.); Ananthanarayan R.; Orient Blackswan; 2005
39. Textbook of Immunology; Haleem Khan, Rajendra Sagar, Sadguna
40. Prescott's Microbiology; Ninth Edition; Joanne M. Willey, Linda M. Sherwood &
41. Christopher J. Woolverton; McGraw-Hill Education; 2014
42. Immunology; Third Edition; Janis Kuby; W.H. Freeman; 1997
43. Kuby Immunology; Sixth Edition; Thomas J. Kindt, Richard A. Goldsby, Barbara Osborne & Janis Kuby; W.H. Freeman; 2007
44. Concepts in Biochemistry; Third Edition; Rodney Boyer; John Wiley & Sons, Inc.; 2006
45. Medical Biochemistry; Fourth Edition; John Baynes & Marek Dominiczak; Saunders (Elsevier); 2014
46. Cellular and Molecular immunology; Abbas A. K., Lichtman A. H. & Pillai S.; Elsevier Health Sciences; 2014
47. Roitt's Essential Immunology – Vol. 20; Delves P. J., Martin S. J., Burton D. R., & Roitt I. M.; John Wiley & Sons; 2011

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48. The Elements of Immunology; Khan F.H.; Pearson Education, India; 2009
49. Kuby Immunology; Sixth Edition; Thomas J. Kindt, Richard A. Goldsby, Barbara A. Osborne & Janis Kuby; W.H. Freeman; 2007
50. Janeway's Immunobiology; Murphy K. & Weaver C.; Garland Science; 2016
51. Fundamental Immunology; Paul W. E.; Philadelphia: Lippincott-Raven; 1999
52. Immunology - Introductory Textbook; Shetty N.; New Age International; 2005
53. Prescott's Microbiology; Ninth Edition; Joanne M. Willey, Linda M. Sherwood & Christopher J. Woolverton; McGraw-Hill Education; 2014
54. Medical Biochemistry; Fourth Edition; John Baynes & Marek Dominiczak; Saunders (Elsevier); 2014
55. Lehninger's Principles of Biochemistry; David Lee Nelson, A. L. Lehninger, Michael M Cox; W.H. Freeman, New York; 2008

56. Biochemistry; 5th ed.; J M Berg, J L Tymoczko and Lubert Stryer; W.H. Freeman, New York; 2002
57. Biochemistry; 2nd edition; Donald Voet and Judith G Voet; J. Wiley and Sons, New York; 1995

ADDITIONAL READING:

58. Biology – A Global Approach; Tenth Edition (Global Edition); Campbell, Reece, Urry, Cain, Wasserman, Minorsky & Jackson; Pearson Education Ltd., England; 2015

59. Biology; Seventh Edition; Neil A. Campbell & Jane B. Reece; Pearson Education, Inc.; 2005
Biology; Student Edition; Kenneth R. Miller & Joseph S. Levine; Prentice Hall; 2007

60. Biology: Eleventh Revised Edition; Sylvia S. Mader & Michael Windelspecht; McGraw-Hill Education; 2012
61. Biology – Concepts & Applications; Sixth Edition; Cecie Starr; Brooks/ Cole; 2005
62. The Emperor of All Maladies: A biography of Cancer; Siddhartha Mukherjee; Scribner, New York; 2010
63. Molecular Cell Biology; Fifth edition; Harvey Lodish, Arnold Berk, Paul Matsudaira, Chris A. Kaiser, Monty Krieger, Matthew P. Scott, S. Lawrence Zipursky & James Darnell; W.H. Freeman & Company, New York; 2004
64. 'India facing shortage of life-saving albumin serum'; written by Abantika Ghosh, New Delhi; The Indian Express, October 16, 2014, 2:25 am
65. Articles on "Blood groups"; (1)The Indian Express, August 15, 2012/ Times of India, August 16, 2012; (2)Times of India, September 11, 2014
66. 'Nanoparticle vaccine shows potential as immunotherapy to fight multiple cancer types'; UT Southwestern Medical Center; Science Daily, April 24 2017; <https://www.sciencedaily.com/>

67. Textbook of Biochemistry with clinical correlations; Fourth Edition: Edited by Thomas M. Devlin; Wiley-Liss Publication.
68. Biochemistry; Third Edition: Pamela C. Champe, Richard A. Harvey, Denise R. Ferrier; Indian Edition by JP Publication.

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Date: 19th October, 2020

To,
Member Secretary,
Academic Council,
Mithibai College (Autonomous),
Vile Parle- West

Subject: Agenda for Academic Council meeting scheduled on _____

Dear Member Secretary,

Kindly include the following agenda for the meeting of Academic Council scheduled for 27th October, 2020.

(Example- Agenda items to be in brief statements)

- i) To approve the format for submission of agenda, notes thereto and curriculum to Academic council
- ii) To confirm/ approve syllabus for _____
- iii) To confirm/ approve-----

Thanking you,

Yours Sincerely,
Head of _____

Recommended by :

Vice-Principal

and Approved by:

I/C Principal

DEPARTMENT OF _____

BOARD OF STUDIES – MEETING

Date - _____ 2020

Time: 2:00 PM

Online on MS Teams

AGENDA

- 1)
- 2)
- 3)
- 4)

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RESOLUTION

At the online Board of Studies - _____ meeting held on _____ at _____ on MS Teams, it was resolved that –

- 1)
- 2)
- 3)
- 4)

S.No.	BOS Members	Signature
1	_____ – Chairperson	
2	Two subject experts outside the parent University: a) b)	
3	Vice-Chancellor -University of Mumbai nominee a)	
4	Representative from Industry a)	
5	Post-graduate meritorious alumnus a)	
6	Members of same faculty - a) b)	
7	Member appointed by Management a)	
8	Faculty members a)	

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	b)	
	c)	
	d)	

MINUTES OF MEETING

S.No.	Agenda Item	Discussion
1.		
2.		
3.		
4.	Any other matter:	

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Shri Vile Parle Kelavani Mandal's
**MITHIBAI COLLEGE OF ARTS, CHAUHAN INSTITUTE OF SCIENCE & AMRUTBE
JIVANLAL COLLEGE OF COMMERCE AND ECONOMICS (AUTONOMOUS)**
*NAAC Reaccredited 'A' grade, CGPA: 3.57 (February 2016),
Granted under RUSA, FIST-DST & -Star College Scheme of DBT, Government of India,
Best College (2016-17), University of Mumbai*

Affiliated to the
UNIVERSITY OF MUMBAI

Program: B.Sc.

Course: USMAZO503

Semester V

**Choice Based Credit System (CBCS) with effect from the
Academic year 2018-19**

PROGRAMME SPECIFIC OUTCOMES (PSO'S)

On completion of the B.Sc.- Zoology, the learners should be enriched with knowledge and be able to-

- PSO1:** _____
- PSO2:** _____
- PSO3:** _____
- PSO4:** _____
- PSO5:** _____
- PSO6:** _____
- PSO7:** _____
- PSO8:** _____

Preamble

Zoology has emerged as a progressive subject in the last decade with innovations in curricular designing and unique initiatives which attracted students, both from urban as well as rural colleges, in large numbers towards this subject. The fundamental challenge however, was to design curricula without dissections, the backbone of the subject. We Zoologists though are firmly against cruelty to animals and practice conservation, had to take it with a pinch of salt that the dead table fish from the market and pests were also banned for dissection. Use of ICT and simulation techniques is strongly recommended to replace the dissections using animals by virtual dissection.

Students may present a research project under the guidance of a teacher from their college or any other college or from the industry or may do so on their own which shall be evaluated by the examiners at the time of the practical examinations and that the performance shall be considered separately as additional optional credits, based on the free choice of student and if permitted by the authorities then the same could be transferred to the other / higher programs if desired.

Care has also been taken to include a unit on muscles which was much neglected so far in anatomy. Possibility cannot be ruled out that it may give further impetus to Zoology students to enter the career of Gym and Fitness. This niche of students shall have upper hand over other personnel in the fitness industry in passing international exams since they already have knowledge of physiology to a desired extent.

This syllabus is framed by incorporating inputs from all the members who represented teachers, students, rank holders, people from the industry and interdisciplinary background, scientists from India and abroad.

Evaluation Pattern

The performance of the learner will be evaluated in two components. The first component will be a Continuous Assessment with a weightage of 25% of total marks per course. The second component will be a Semester end Examination with a weightage of 75% of the total marks per course. The allocation of marks for the Continuous Assessment and Semester end Examinations is as shown below:

a) Details of Continuous Assessment (CA)

25% of the total marks per course:

Continuous Assessment	Details	Marks
Component 1 (CA-1)	Test/Assignment/Tutorial/ Visit/Project/ Presentation	15 marks
Component 2 (CA-2)	Test/Assignment/Tutorial/ Visit/Project/ Presentation	10 marks

b) Details of Semester End Examination

75% of the total marks per course. Duration of examination will be two and half hours.

Question Number	Description	Marks	Total Marks
Total Marks			75

Signature

Signature

Signature

HOD

Approved by Vice –Principal

Approved by Principal

**SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben
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Program: B.Sc. (2021-22)				Semester: V	
Course: MAMMALIAN HISTOLOGY, BASIC TOXICOLOGY, GENERAL PATHOLOGY AND BIOSTATISTICS				Course Code: USMAZO503	
Teaching Scheme				Evaluation Scheme	
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Continuous Assessment (CA) (Marks - 25)	Semester End Examinations (SEE) (Marks- 75 in Question Paper)
4	4	---	2.5+1.5=4	25	75
Learning Objectives:					
<ul style="list-style-type: none"> • To familiarize the learner with the cellular architecture of the various organs in the body. • To make the learner understand the need and importance of different types of tissues in the vital organs and their functions. • To introduce the learner to the principles of toxicology with particular emphasis on toxic responses to chemical exposures, nature and effect of toxicity and toxicity testing. • It also intends to develop amongst students an introductory understanding of regulatory affairs in toxicology. • To introduce the learner to basics of general pathology. • To impart knowledge of retrogressive, necrotic, pathological conditions in the body. • To explain repair mechanism of the body. • To make learner familiar with biostatistics as an important tool of analysis and its applications. 					
Course Outcomes:					
After completion of the course, learners would be able to:					
CO1: Appreciate the well-planned organization of tissues and cells in the organ systems.					
CO2: Develop broad understanding of the different areas of toxicology.					
CO3: Develop critical thinking and assist students in preparation for employment in pharmaceutical industry and related areas.					
CO4: Be familiar with various medical terminology pertaining to pathological condition of the body caused due to diseases.					
CO5: Be able to collect, organize and analyze data using parametric and non- parametric tests.					
CO6: Be able to set up a hypothesis and verify the same using limits of significance.					
Outline of Syllabus: (per session plan)					
Module	Description				No of Hours
1	<p><u>Mammalian Histology</u></p> <p>1.1: Vertical section (V.S.) of skin: Layers and cells of epidermis; papillary and reticular layers of dermis; sweat glands, sebaceous glands and skin receptors</p> <p>1.2: Digestive System</p> <p>1.2.1: Vertical section (V.S.) of tooth; hard tissue – dentine and enamel; soft tissue – dentinal pulp and periodontal ligaments</p> <p>1.2.2: Transverse section (T.S.) of tongue – mucosal papillae and taste buds</p> <p>1.2.3: Alimentary canal – Transverse section (T.S.) of stomach, small intestine, large intestine of mammal.</p> <p>1.2.4: Glands associated with digestive system – Transverse section (T.S.) of salivary glands, liver.</p>				15

2	<p><u>Toxicology</u> 2.1: Basic toxicology 2.1.1: Introduction to toxicology – brief history, different areas of toxicology, principles and scope of toxicology 2.1.2: Toxins and Toxicants – Phytotoxins (caffeine, nicotine), Mycotoxins (aflatoxins), Zootoxins (cnidarian toxin, bee venom, scorpion venom, snake venom) 2.1.3: Characteristics of Exposure – Duration of exposure, Frequency of exposure, Site of exposure and Routes of exposure 2.1.4: Types of Toxicity – Acute toxicity, Sub-acute toxicity, Sub-chronic toxicity and Chronic toxicity 2.1.5: Concept of LD50, LC50, ED50 2.1.6: Dose Response relationship – Individual / Graded dose response, Quantal dose response, shape of dose response curves, Therapeutic index, Margin of safety 2.1.7: Dose translation from animals to human – Concept of extrapolation of dose, NOAEL (No Observed Adverse Effect Level), Safety factor, ADI (Acceptable Daily Intake) 2.1.8: Target organ toxicity: Hepatotoxicity: susceptibility of the liver, types of liver injury, examples of hepatotoxicants; Neurotoxicity: vulnerability of nervous system, examples of neurotoxicants; Nephrotoxicity: susceptibility of kidney, examples of nephrotoxicants 2.2: Regulatory toxicology 2.2.1: OECD guidelines for testing of chemicals (an overview) 2.2.2: CPCSEA guidelines for animal testing centre, ethical issues in animal studies 2.2.3: Animal models used in regulatory toxicology studies 2.2.4: Alternative methods in toxicology (<i>in vitro</i> tests)</p>	15
3	<p><u>General Pathology</u> 3.1: General Pathology: Introduction and scope 3.2: Cell injury: Mechanisms of cell injury: ischemic, hypoxic, free radical mediated and chemical</p>	15

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	<p>3.3: Retrogressive changes: Definition, cloudy swelling, degeneration: fatty, mucoid and amyloid (causes and effects)</p> <p>3.4: Disorders of pigmentation: Endogenous: Brief ideas about normal process of pigmentation, melanosis, jaundice (causes and effects)</p> <p>3.5: Necrosis: Definition and causes; nuclear and cytoplasmic changes; types: coagulative, liquefactive, caseous, fat and fibroid</p> <p>3.6: Gangrene: Definition and types – dry, moist and gas gangrene</p>	
4	<p><u>Biostatistics</u></p> <p>4.1: Probability Distributions: Normal, Binomial, Poisson distribution, Z-transformation, p value, Probability - Addition and multiplication rules and their applications.</p> <p>4.2: Measures of Variation: Variance, standard deviation, standard error</p> <p>4.3: Testing of Hypothesis: Basic concepts, types of hypothesis: Null hypothesis and Alternate hypothesis, Levels of significance and testing of hypothesis</p> <p>4.4: Parametric and non-parametric test: Parametric tests: two-tailed Z-test and t-test Non-parametric test: Chi-square test and its applications</p> <p>4.5: Correlation: Correlation coefficient and its significance</p>	15
	Total	60
<p>PRACTICALS</p> <ol style="list-style-type: none"> 1. Study of mammalian tissues: V.S. of Tooth, T.S. of Stomach, T.S. of small intestine, T.S. of Liver. 2. Microtomy: Tissue preservation and fixation, dehydration, infiltration, paraffin embedding and block preparation, sectioning, staining. 3. Identification of diseases or conditions (from slides or pictures): Vitiligo, Psoriasis, Bed sores, Necrosis, Oedema 4. To study the effect of CCl₄ on the level of enzyme activity in liver on aspartate and alanine amino transferase, alkaline phosphatase (<i>in vitro</i> approach). 5. Study and interpretation of pathological reports: Blood, Urine and Stool (faeces). 6. Following biostatistics practicals will be done using data analysis tool of Microsoft Excel (DEMONSTRATION in regular practicals) & manually: <ol style="list-style-type: none"> a. Problems based on Z test b. Problems based on t test c. Problems based on Chi square test d. Correlation, regression analysis – demonstration only. e. Problems based on ANOVA – demonstration only. <p>(Learner is expected to identify appropriate test for the given problem)</p>		

Unit	Topic	No. of Hours/Credits
Module 1	Mammalian Histology	15
Module 2	Toxicology	15
Module 3	General Pathology	15
Module 4	Biostatistics	15

To develop scientific temper and interest by exposure through industrial visits and study/educational tours is recommended in each semester

PRACTICAL III

Unit	Topic	No. of Hours/Credits
	Zoology Practical-III	1.5 credits

Suggested Readings

1. A Textbook of Histology; Deshmukh Shivaji; Dominant Pub. □ Colour Textbook of Histology; Gartner, Leslie P.; Saunders.
2. A Textbook of Histology; Mathur Ramesh; Anmol Pub.
3. A Textbook of Histology and A Practical Guide; Gunasegaran J.P.; Elsevier □ A Textbook of Histology; Khanna D.R.; Sonali Pub.
4. Practical Zoology; Second Edition; Dr. K.C. Ghose&Dr. B. Manna; New Central Book Agency Pvt. Ltd. , Kolkata; 1999.
5. Casarett and Doulls Toxicology – The basic science of poisons; Edited by Curtis Klaassen; McGraw-Hill; 2001.

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6. Toxicological testing handbook – Principles, applications and data interpretation; David Jacobson-Kram and Kit Keller; CRC Press; 2006
7. Principles and methods of toxicology; A. Wallace Hayes; CRC Press; 2007
8. Toxicology – principles and methods; M.A. Subramanian; MJP Publishers, Chennai; 2004
9. Fundamentals of Toxicology; KamleshwarPandey and JP Shukla; New Central book agency Ltd., Kolkata; 2011
10. Elements of Toxicology; KamleshwarPandey and JP Shukla; Wisdom Press, New Delhi; 2010
11. Principles and Applications of Toxicology; Lahir Y.K.; Seekay Publications; 2013 □ Essentials of Clinical Toxicology; Lall S.; Narosa Publishing House; 1998.
12. A Textbook of Veterinary and General Pathology; Second edition; J. L. Vagad; IBDC Publishers
13. Clinical Pathology; Guru G.; NCERT; 1988.
14. Clinical Pathology; BatraNeelam; Vikas Publishing House Pvt. Ltd.; Nov. 1982.
15. Essentials of General Pathology; Dr. Sudha Shivraj, Dr. Satish Kumar Amarnath, Dr. Sheela Devi; Exclusively distributed by CBS Publishers & Distributors
16. Textbook of Pathology; Harsh Mohan; Jaypee Publishers
17. Biostatistics – The Bare Essentials; Third Edition; Geoffrey R. Norman, David L. Streiner; B.C. Decker, Inc., Hamilton; 2008
18. Fundamentals of Biostatistics; Second Edition; Veer Bala Rastogi; Ane Books Pvt. Ltd., New Delhi; 2009 (Reprint 2010)
19. Fundamentals of Biostatistics; Second Revised Edition; Irfan Ali Khan and AtiyaKhanum; Ukaaz Publications, Hyderabad; 2004
20. Instant Medical Biostatistics; Dr. Ranjan Das and Dr.Papri N. Das; Ane Books Pvt. Ltd., New Delhi; 2009
21. Primer of Biostatistics; Fifth Edition; Stanton A. Glantz; McGraw-Hill Companies, Inc.; 2002
22. Basic Biostatistics – Statistics for Public Health Practice; Second Edition; B. Burt Gerstman; Jones and Bartlett Learning Burlington; 2015
23. Biostatistics – A Guide to Design, Analysis, and Discovery; Second Edition; Ronald N. Forthofer, Eun Sul Lee and Mike Hernandez; Elsevier, Inc., (Academic Press), USA; 2007
24. Statistics in Biology and Psychology; Sixth Edition; Debajyoti Das and Arati Das; Academic Publishers, Kolkata

ADDITIONAL READING:

25. *Biology – A Global Approach; Tenth Edition (Global Edition); Campbell, Reece, Urry, Cain, Wasserman, Minorsky & Jackson; Pearson Education Ltd., England; 2015*
26. *Biology; Seventh Edition; Neil A. Campbell & Jane B. Reece; Pearson Education, Inc.; 2005*
27. *Biology; Student Edition; Kenneth R. Miller & Joseph S. Levine; Prentice Hall; 2007*
28. *Biology: Eleventh Revised Edition; Sylvia S. Mader & Michael Windelspecht; McGraw- Hill Education; 2012*
29. *Biology – Concepts & Applications; Sixth Edition; Cecie Starr; Brooks/ Cole; 2005* □ *Prescott's Microbiology; Ninth Edition; Joanne M. Willey, Linda M. Sherwood & Christopher J. Woolverton; McGraw-Hill Education; 2014*
30. *Disease & Medicine in India – A Historical Overview; Deepak Kumar; Tulika Books, India; 2012*

**SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben
Jivanlal College of Commerce & Economics (AUTONOMOUS)**

Date: 19th October, 2020

To,
Member Secretary,
Academic Council,
Mithibai College (Autonomous),
Vile Parle- West

Subject: Agenda for Academic Council meeting scheduled on _____

Dear Member Secretary,

Kindly include the following agenda for the meeting of Academic Council scheduled for 27th October, 2020.

(Example- Agenda items to be in brief statements)

- i) To approve the format for submission of agenda, notes thereto and curriculum to Academic council
- ii) To confirm/ approve syllabus for _____
- iii) To confirm/ approve-----

Thanking you,

Yours Sincerely,
Head of _____

Recommended by :

Vice-Principal

and Approved by:

I/C Principal

DEPARTMENT OF _____

BOARD OF STUDIES – MEETING

Date - _____ 2020

Time: 2:00 PM

Online on MS Teams

AGENDA

- 1)
- 2)
- 3)
- 4)

**SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben
Jivanlal College of Commerce & Economics (AUTONOMOUS)**

RESOLUTION

At the online Board of Studies - _____ meeting held on _____ at _____ on MS Teams, it was resolved that –

- 1)
- 2)
- 3)
- 4)

S.No.	BOS Members	Signature
1	_____ – Chairperson	
2	Two subject experts outside the parent University: a) b)	
3	Vice-Chancellor -University of Mumbai nominee a)	
4	Representative from Industry a)	
5	Post-graduate meritorious alumnus a)	
6	Members of same faculty - a) b)	
7	Member appointed by Management a)	
8	Faculty members a)	

**SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben
Jivanlal College of Commerce & Economics (AUTONOMOUS)**

	b)	
	c)	
	d)	

MINUTES OF MEETING

S.No.	Agenda Item	Discussion
1.		
2.		
3.		
4.	Any other matter:	

SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben
Jivanlal College of Commerce & Economics (AUTONOMOUS)



Shri Vile Parle Kelavani Mandal's
**MITHIBAI COLLEGE OF ARTS, CHAUHAN INSTITUTE OF SCIENCE & AMRUTBE
JIVANLAL COLLEGE OF COMMERCE AND ECONOMICS (AUTONOMOUS)**
*NAAC Reaccredited 'A' grade, CGPA: 3.57 (February 2016),
Granted under RUSA, FIST-DST & -Star College Scheme of DBT, Government of India,
Best College (2016-17), University of Mumbai*

Affiliated to the
UNIVERSITY OF MUMBAI

Program: B.Sc.

Course: USMAZO504

Semester V

**Choice Based Credit System (CBCS) with effect from the
Academic year 2018-19**

PROGRAMME SPECIFIC OUTCOMES (PSO'S)

On completion of the B.Sc.- Zoology, the learners should be enriched with knowledge and be able to-

- PSO1:** _____
- PSO2:** _____
- PSO3:** _____
- PSO4:** _____
- PSO5:** _____
- PSO6:** _____
- PSO7:** _____
- PSO8:** _____

Preamble

Zoology has emerged as a progressive subject in the last decade with innovations in curricular designing and unique initiatives which attracted students, both from urban as well as rural colleges, in large numbers towards this subject. The fundamental challenge however, was to design curricula without dissections, the backbone of the subject. We Zoologists though are firmly against cruelty to animals and practice conservation, had to take it with a pinch of salt that the dead table fish from the market and pests were also banned for dissection. Use of ICT and simulation techniques is strongly recommended to replace the dissections using animals by virtual dissection.

Students may present a research project under the guidance of a teacher from their college or any other college or from the industry or may do so on their own which shall be evaluated by the examiners at the time of the practical examinations and that the performance shall be considered separately as additional optional credits, based on the free choice of student and if permitted by the authorities then the same could be transferred to the other / higher programs if desired.

Care has also been taken to include a unit on muscles which was much neglected so far in anatomy. Possibility cannot be ruled out that it may give further impetus to Zoology students to enter the career of Gym and Fitness. This niche of students shall have upper hand over other personnel in the fitness industry in passing international exams since they already have knowledge of physiology to a desired extent.

This syllabus is framed by incorporating inputs from all the members who represented teachers, students, rank holders, people from the industry and interdisciplinary background, scientists from India and abroad.

Evaluation Pattern

The performance of the learner will be evaluated in two components. The first component will be a Continuous Assessment with a weightage of 25% of total marks per course. The second component will be a Semester end Examination with a weightage of 75% of the total marks per course. The allocation of marks for the Continuous Assessment and Semester end Examinations is as shown below:

a) Details of Continuous Assessment (CA)

25% of the total marks per course:

Continuous Assessment	Details	Marks
Component 1 (CA-1)	Test/Assignment/Tutorial/ Visit/Project/ Presentation	15 marks
Component 2 (CA-2)	Test/Assignment/Tutorial/ Visit/Project/ Presentation	10 marks

b) Details of Semester End Examination

75% of the total marks per course. Duration of examination will be two and half hours.

Question Number	Description	Marks	Total Marks
Total Marks			75

Signature

HOD

Signature

Approved by Vice –Principal

Signature

Approved by Principal

**SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben
Jivanlal College of Commerce & Economics (AUTONOMOUS)**

Program: B.Sc. (2021-22)				Semester: V	
Course: INTEGUMENTARY SYSTEM, HUMAN OSTEOLOGY, LIMB MUSCLES AND DEVELOPMENTAL BIOLOGY OF CHICK				Course Code: USMAZO504	
Teaching Scheme				Evaluation Scheme	
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Continuous Assessment (CA) (Marks - 25)	Semester End Examinations (SEE) (Marks- 75 in Question Paper)
4	4	---	2.5+1.5=4	25	75
Learning Objectives:					
<ul style="list-style-type: none"> • To introduce the learner to understand different integumentary structures and derivatives in the vertebrates and to acquaint learners with special derivatives of integument. • To introduce the learner to different bones of human skeleton and their functional importance. • To study long limb muscles involved in body movements. • To identify various arrangements of the long limb muscles and to relate the arrangement with contraction and motion. • To study muscle injuries and syndromes. • To introduce the learner to the basics of developmental biology with reference to chick as a model and also familiarize with experiments related to it. 					
Course Outcomes:					
After completion of the course, learners would be able to:					
CO1: Understand the importance of various types of epidermal and dermal derivatives along with their functions.					
CO2: Understand the structure, types and functions of human skeleton.					
CO3: Understand the types of long limb muscles, its arrangement and their role in body movements.					
CO4: Understand the processes involved in embryonic development and practical applications of studying the chick embryology.					
Outline of Syllabus: (per session plan)					
Module	Description				No of Hours
1	<u>Integumentary system and derivatives</u> 1.1: Basic structure of integument: Epidermis and dermis 1.2: Epidermal derivatives of Vertebrates 1.2.1: Hair, hoof, horn, claw, teeth, beak and epidermal scales (small scales, large scales, modified scales – spine) 1.2.2: Glands – types (mucous, serous, ceruminous, poison, uropygial and salt gland) and functions 1.2.3: Type of feathers				15

	<p>1.3: Dermal derivatives of Vertebrates: Scales in fish; scutes in reptiles and birds; dermal scales in mammals – Armadillo, Antler – Caribou</p> <p>1.4: Special derivatives of integument: Wart in toad, rattle in snake, whale bone in baleen whale, kneepads in camel.</p>	
2	<p><u>Human Osteology</u></p> <p>2.1: Introduction: Bone structure (Histology), physical properties, chemical composition and general functions of bones.</p> <p>Cartilage: General structure, functions</p> <p>2.2: Axial skeleton</p> <p>2.2.1: Skull: General characteristics of skull bones - Cranial and facial bones</p> <p>2.2.2: Vertebral column: General characteristics of a vertebra, structure of different types of vertebrae (cervical, thoracic, lumbar, sacrum and coccyx)</p> <p>2.2.3: Ribs and sternum: General skeleton of ribs and sternum</p> <p>2.2.4: Hyoid bone: Structure and function.</p> <p>2.3: Appendicular skeleton</p> <p>2.3.1: Pectoral girdle and bones of forelimbs</p> <p>2.3.2: Pelvic girdle and bones of hind limbs</p>	15
3	<p><u>Muscles of long bones of Human limbs</u></p> <p>3.1: Introduction and types of long limb muscles</p> <p>3.1.1: Flexors, Extensor, Rotator, Abductors, Adductors</p> <p>3.2: Muscles of forelimbs</p> <p>3.2.1: Muscles that move the arm (Humerus) – <i>Triceps brachii</i>, <i>Biceps brachii</i>, <i>brachialis</i> and <i>brachioradialis</i></p> <p>3.2.2: Muscles that move the forearm (Radius-ulna) – <i>Flexor carpi radialis</i>, <i>Flexor carpi ulnaris</i> and <i>Extensor carpi ulnaris</i></p> <p>3.2.3: Muscles that move the wrist, hand and fingers – <i>Flexor digitorum superficialis</i>, <i>Extensor carpi radialis</i> and <i>Extensor digitorum</i></p> <p>3.3: Muscles of hind limbs</p>	15

	<p>3.3.1: Muscles that move the thigh (Femur) – Sartorius, Adductor group, Quadriceps group (<i>Rectus femoris, Vastus lateralis, Vastus medialis</i>), Hamstring group (<i>Biceps femoris, Semimembranosus, Semitendinosus</i>)</p> <p>3.3.2: Muscles that move the lower leg (tibia-fibula) – <i>Fibularis longus, Gastrocnemius, Tibialis anterior, Soleus, Extensor digitorum longus</i> and <i>Fibularis tertius</i></p> <p>3.3.3: Muscles that move the ankle, foot and toes - <i>Tibialis anterior, Extensor digitorum, Longus</i> and <i>Fibularis</i> muscles</p>	
4	<p><u>Developmental biology of Chick</u></p> <p>4.1: Introduction to Developmental Biology: Basic concept and principles of developmental biology - morphogenesis, organogenesis, fate maps, cell adhesion, cell affinity and cell differentiation.</p> <p>4.2: Development of Chick embryo</p> <p>4.2.1: Structure of Hen's egg, physico-chemical nature and forms of yolk- granular, platelets and spheres; fertilization, cleavage, blastulation, gastrulation</p> <p>4.2.2: Structure of chick embryo – 18 hours, 24 hours, 33 hours, 48 hours and 72 hours</p> <p>4.2.3: Extra embryonic membranes</p> <p>4.2.4: Organizer: Introduction, Spemann Mangold experiment, Hensen's node as an organizer.</p>	15
	Total	60
<p>PRACTICALS</p> <ol style="list-style-type: none"> 1. Study of integumentary systems – V. S. of Skin of Shark, Frog, <i>Calotes</i>, Pigeon and Human 2. Study of Human Axial Skeleton – Skull and Vertebral column 3. Study of Human Appendicular Skeleton – Pectoral and pelvic girdle with limb bones 4. Study of muscles of forelimbs – <i>Biceps brachii, Brachialis, Brachio radialis, Triceps brachii, Flexor carpi radialis, Flexor carpi ulnaris</i> and <i>Extensor carpi ulnaris</i> 5. Study of muscles of hind limbs – Sartorius, Adductor group, Quadriceps group 6. <i>Rectus femoris, Vastus lateralis, Vastus medialis, Hamstring group (Biceps femoris, Semimembranosus, Semitendinosus), Fibularis longus, Gastrocnemius</i> 7. <i>Tibialis anterior, Soleus, Extensor digitorum longus, Fibularis tertius</i> 8. Study of ontogeny of chick embryo using permanent slides – 18 hours, 24 hours, 33 hours, 48 hours and 72 hours. 9. Prepare temporary mounting of chick embryo up to 48 hours of incubation (demonstration). 		

**SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben
Jivanlal College of Commerce & Economics (AUTONOMOUS)**

Unit	Topic	No. of Hours/Credits
Module 1	Integumentary system and derivatives	15
Module 2	Human Osteology	15
Module 3	Muscles of long bones of Human limbs	15
Module 4	Developmental biology of Chick	15

To develop scientific temper and interest by exposure through industrial visits and study/educational tours is recommended in each semester

PRACTICAL IV

Unit	Topic	No. of Hours/Credits
	Zoology Practical-IV	1.5 credits

Suggested Readings

1. Comparative Anatomy of the Vertebrates; Ninth Edition; Kent, G.C. and Carr R.K.; The McGraw-Hill Companies; 2000
2. Text book of Chordates; Saras publication
3. Modern text book of Zoology; Prof. R.L. Kotpal
4. Integumentary system and its derivatives; Samuel D. Hodge
5. Atlas of Human Anatomy – Vol I; R.D. Sinelnikov; Mr. Publishers Moscow
6. A Guide of Osteology (for medical students); Prakash Kendra, Lucknow
7. Text Book of Comparative Anatomy and Physiology; Tortora
8. Human Osteology – Tim D White
9. Text Book of Human Osteology – Singh Inderbir
10. Mechanisms of Body Functions; Second Edition; Dexter M. Easton; Prentice-Hall of India Pvt. Ltd., New Delhi; 1978
11. Human Anatomy – John W. Hole, Jr., Karen A. Koos, Publisher: W. C. Brown Publisher, USA.
12. Principles of Anatomy and Physiology – Gerard T. Tortora and Sandra Reynolds Grabowski. Publisher: Harpers Collins College Publishers (7th Edition).

**SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben
Jivanlal College of Commerce & Economics (AUTONOMOUS)**

13. Developmental biology – Gilbert
14. Development of Chick – Patten
15. Developmental Biology – Wolpert
16. Text book of Embryology – N. Arumugam
17. Chicken Development – Embryology; W.H. Freeman & B. Bracegirdle
18. Practical Zoology; Second Edition; Dr. K.C. Ghose & Dr. B. Manna; New Central Book Agency Pvt. Ltd. , Kolkata; 1999

ADDITIONAL READING

19. Comparative Anatomy of Vertebrates by Sumitra Saxena and R K Saxena
20. Comparative Anatomy of Vertebrates by S K Kulshrestha
21. Vertebrates: Comparative Anatomy, Function, Evolution by Kenneth Kardong
22. Comparative Anatomy of the Vertebrates by George C Kent and Robert K Carr
23. Comparative Anatomy of Vertebrates by Robert Wiedersheim
24. Illustrations of Comparative Anatomy, Vertebrate and Invertebrate – For The Use of Students In The Museum Of Zoology And Comparative Anatomy □ Human Osteology, 3rd Edition by Tim D. White, Michael T. Black and Pieter A. Folkens.
25. Hand Book of Osteology, 13th Edition by S. Poddar and Ajay Bhagat
26. The Anatomy and Biology of the Human Skeleton by D. Gentry Steele
27. Atlas of Chick Development – By Ruth Bellairs and Mark Osmond
28. Laboratory embryology of the chick by Lloyd Eugene Downs
29. Vertebrate Embryology: A Laboratory Manual - Richard M. Eakin
30. Molecular Embryology: Methods and Protocols by Paul T. Sharpe, Ivor
31. Dictionary of Developmental Biology and Embryology by Frank J. Dye

**SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben
Jivanlal College of Commerce & Economics (AUTONOMOUS)**

Date: 19th October, 2020

To,
Member Secretary,
Academic Council,
Mithibai College (Autonomous),
Vile Parle- West

Subject: Agenda for Academic Council meeting scheduled on _____

Dear Member Secretary,

Kindly include the following agenda for the meeting of Academic Council scheduled for 27th October, 2020.

(Example- Agenda items to be in brief statements)

- i) To approve the format for submission of agenda, notes thereto and curriculum to Academic council
- ii) To confirm/ approve syllabus for _____
- iii) To confirm/ approve-----

Thanking you,

Yours Sincerely,
Head of _____

Recommended by :

Vice-Principal

and Approved by:

I/C Principal

**SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben
Jivanlal College of Commerce & Economics (AUTONOMOUS)**

DEPARTMENT OF _____

BOARD OF STUDIES – MEETING

Date - _____ 2020

Time: 2:00 PM

Online on MS Teams

AGENDA

- 1)
- 2)
- 3)
- 4)

**SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben
Jivanlal College of Commerce & Economics (AUTONOMOUS)**

RESOLUTION

At the online Board of Studies - _____ meeting held on _____ at _____ on MS Teams, it was resolved that –

- 1)
- 2)
- 3)
- 4)

S.No.	BOS Members	Signature
1	_____ – Chairperson	
2	Two subject experts outside the parent University: a) b)	
3	Vice-Chancellor -University of Mumbai nominee a)	
4	Representative from Industry a)	
5	Post-graduate meritorious alumnus a)	
6	Members of same faculty - a) b)	
7	Member appointed by Management a)	
8	Faculty members a)	

**SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben
Jivanlal College of Commerce & Economics (AUTONOMOUS)**

	b)	
	c)	
	d)	

MINUTES OF MEETING

S.No.	Agenda Item	Discussion
1.		
2.		
3.		
4.	Any other matter:	



Shri Vile Parle Kelavani Mandal's
**MITHIBAI COLLEGE OF ARTS, CHAUHAN INSTITUTE OF SCIENCE & AMRUTBE
JIVANLAL COLLEGE OF COMMERCE AND ECONOMICS (AUTONOMOUS)**
*NAAC Reaccredited 'A' grade, CGPA: 3.57 (February 2016),
Granted under RUSA, FIST-DST & -Star College Scheme of DBT, Government of India,
Best College (2016-17), University of Mumbai*

Affiliated to the
UNIVERSITY OF MUMBAI

Program: B.Sc.

Course: USMAZO601

Semester VI

**Choice Based Credit System (CBCS) with effect from the
Academic year 2018-19**

PROGRAMME SPECIFIC OUTCOMES (PSO'S)

On completion of the B.Sc.- Zoology, the learners should be enriched with knowledge and be able to-

- PSO1:** _____
- PSO2:** _____
- PSO3:** _____
- PSO4:** _____
- PSO5:** _____
- PSO6:** _____
- PSO7:** _____
- PSO8:** _____

Preamble

Zoology has emerged as a progressive subject in the last decade with innovations in curricular designing and unique initiatives which attracted students, both from urban as well as rural colleges, in large numbers towards this subject. The fundamental challenge however, was to design curricula without dissections, the backbone of the subject. We Zoologists though are firmly against cruelty to animals and practice conservation, had to take it with a pinch of salt that the dead table fish from the market and pests were also banned for dissection. Use of ICT and simulation techniques is strongly recommended to replace the dissections using animals by virtual dissection.

Students may present a research project under the guidance of a teacher from their college or any other college or from the industry or may do so on their own which shall be evaluated by the examiners at the time of the practical examinations and that the performance shall be considered separately as additional optional credits, based on the free choice of student and if permitted by the authorities then the same could be transferred to the other / higher programs if desired.

Care has also been taken to include a unit on muscles which was much neglected so far in anatomy. Possibility cannot be ruled out that it may give further impetus to Zoology students to enter the career of Gym and Fitness. This niche of students shall have upper hand over other personnel in the fitness industry in passing international exams since they already have knowledge of physiology to a desired extent.

This syllabus is framed by incorporating inputs from all the members who represented teachers, students, rank holders, people from the industry and interdisciplinary background, scientists from India and abroad.

Evaluation Pattern

The performance of the learner will be evaluated in two components. The first component will be a Continuous Assessment with a weightage of 25% of total marks per course. The second component will be a Semester end Examination with a weightage of 75% of the total marks per course. The allocation of marks for the Continuous Assessment and Semester end Examinations is as shown below:

a) Details of Continuous Assessment (CA)

25% of the total marks per course:

Continuous Assessment	Details	Marks
Component 1 (CA-1)	Test/Assignment/Tutorial/ Visit/Project/ Presentation	15 marks
Component 2 (CA-2)	Test/Assignment/Tutorial/ Visit/Project/ Presentation	10 marks

b) Details of Semester End Examination

75% of the total marks per course. Duration of examination will be two and half hours.

Question Number	Description	Marks	Total Marks
Total Marks			75

Signature

Signature

Signature

HOD

Approved by Vice –Principal

Approved by Principal

SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben
Jivanlal College of Commerce & Economics (AUTONOMOUS)

Program: B.Sc. (2021-22)				Semester: VI	
Course: TAXONOMY AND TYPE STUDY II				Course Code: USMAZO601	
Teaching Scheme			Evaluation Scheme		
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Continuous Assessment (CA) (Marks - 25)	Semester End Examinations (SEE) (Marks- 75 in Question Paper)
4	4	---	2.5+1.5=4	25	75

Learning Objectives:

- To introduce basic concepts of modern Chordate classification with evolution point of view and to understand the concept of taxonomy in higher animal kingdom.
- To introduce the learners to the distinguishing characters of classes Reptilia, Aves and Mammalia and their adaptive features with reference to their habitat.
 - To study in depth one vertebrate animal type i. e. general characteristics and salient features of animal type - shark.

Course Outcomes:

After completion of the course, learners would be able to:

CO1: Get an idea of origin of Chordates, its taxonomy up to class with reference to phylogeny and their special features.

CO2: Understand the characteristic features and examples of class of Reptilia, Aves and Mammalia.

CO3: Get an idea of vertebrate animal life after studying one representative animal Shark

Outline of Syllabus: (per session plan)

Module	Description	No of Hours
1	<p><u>Phylum Chordata: Group Protochordata and Group Euchordata I</u></p> <p>1.1: General characters, Difference between non-chordates and chordates Origin of chordates: Annelids as ancestors, Arachnids as ancestors and affinities with Echinodermata</p> <p>1.2: Protochordata 1.2.1: General characters of Group Protochordata</p> <p>1.2.2: Distinguishing characters of Subphylum Urochordata and Cephalochordata</p> <p>1.2.3: Subphylum Urochordata</p> <ul style="list-style-type: none"> • Class Ascidiacea e.g. <i>Herdmania</i> • Class Thaliacea e.g. <i>Salpa</i> • Class Larvacea e.g. <i>Oikopleura</i> <p>1.2.4: Subphylum Cephalochordata □ Class Leptocardii e.g. Branchiostoma (Amphioxus)</p>	15

	<p>1.3: Group Euchordata I Group Euchordata: General characters</p> <ul style="list-style-type: none"> □ Subphylum Vertebrata: General characters □ Division Agnatha and Gnathostomata: Distinguishing characters. <p>General characters with examples of:</p> <ul style="list-style-type: none"> • Class Ostracodermii e.g. <i>Cephalaspis</i> • Class Cyclostomata e.g. <i>Petromyzon</i> (Lamprey) 	
2	<p><u>Group Euchordata II</u></p> <p>2.2.1: Division: Gnathostomata Superclass: Pisces and Tetrapoda Superclass – Pisces: Distinguishing characters</p> <ul style="list-style-type: none"> • Class Placodermi e.g. <i>Climatius</i> • Class Chondrichthyes e.g. <i>Rhinobatus</i> (Guitar fish) • Class Osteichthyes e.g. <i>Exocetus</i> (Flying fish) <p>2.2.2: Dipnoi (Lung fish): Distribution, habit and habitat, external and internal characters, affinities with super class Pisces, affinities and differences with class Amphibia</p> <p>2.3: Superclass Tetrapoda</p> <ul style="list-style-type: none"> □ Class Amphibia: General characters <p>Examples:</p> <ol style="list-style-type: none"> a. Limbless amphibian e.g. <i>Ichthyophis</i> (Caecilian) b. Tailed amphibian e.g. <i>Amphiuma</i> c. Tailless amphibian e.g. <i>Hyla</i> (Tree frog) 	15
3	<p><u>Group Euchordata III</u></p> <p>3.1: Class Reptilia: General characters</p> <p>Examples</p> <ol style="list-style-type: none"> a. Extinct reptile e.g. <i>Ichthyosaurus</i> b. Living fossil e.g. <i>Sphenodon</i> c. Aquatic reptile e.g. <i>Chelonia sp.</i> (Sea turtle) d. Arboreal reptile e.g. Chamaeleon <p>3.2: Class Aves: General Characters</p> <p>Examples</p>	15

	<p>a. Arboreal bird e.g. <i>Melanerpes sp.</i> (Wood pecker) b. Terrestrial bird e.g. <i>Gallus sp.</i> (Jungle fowl) c. Swimming bird e.g. <i>Phalacrocorax sp.</i> (Cormorant) d. Wading bird e.g. <i>Ardeola sp.</i> (Pond heron) e. Birds of prey e.g. <i>Tyto sp.</i> (Owl) f. Flightless birds e.g. <i>Dromaius sp.</i> (Emu)</p> <p>3.3: Class Mammalia: General characters Examples</p> <p>a. Egg-laying mammals e.g. <i>Ornithorhyncus sp.</i> (Duck-billed platypus) b. Pouched mammals e.g. <i>Macropus sp.</i> (Kangaroo) c. Insect eating mammals e.g. <i>Sorex sp.</i> (Common shrew) d. Toothless mammals e.g. <i>Bradypus sp.</i> (Sloth) e. Gnawing mammals e.g. <i>Funambulus sp.</i> (Squirrel) f. Primates e.g. <i>Macaca sp.</i> (Monkey)</p>	
4	<p><u>Type study: Shark</u></p> <p>4.1: Habit & habitat, distribution, external characters, classification and economic importance.</p> <p>4.2: Skin, exoskeleton, endoskeleton and systems</p> <p>a. Digestive system b. Respiratory system c. Blood vascular system d. Nervous system and receptor organs e. Urinogenital system, copulation, fertilization and development</p>	15
	Total	60
<p>PRACTICALS</p> <p>1. Group Protochordata</p> <ul style="list-style-type: none"> ▪ Subphylum Urochordata <ul style="list-style-type: none"> • Class Larvacea e.g. <i>Oikopleura</i> • Class Ascidiacea e.g. <i>Ciona</i> • Class Thaliacea e.g. <i>Salpa</i> ▪ Subphylum Cephalochordata <ul style="list-style-type: none"> • Class Leptocardii e.g. <i>Branchiostoma</i> (Amphioxus) ▪ Subphylum Vertebrata: Division Agnatha <ul style="list-style-type: none"> • Class Ostracodermi e.g. <i>Pharyngolepis</i> • Class Cyclostomata e.g. <i>Petromyzon</i> <p>2. Division Gnathostomata o Superclass Pisces:</p> <ul style="list-style-type: none"> • Class Placodermi e.g. <i>Bothriolepis</i> • Class Chondrichthyes e.g. <i>Rhinobates</i>, Chimaera 		

**SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben
Jivanlal College of Commerce & Economics (AUTONOMOUS)**

Unit	Topic	No. of Hours/Credits
Module 1	Phylum Chordata: Group Protochordata and Group Euchordata I	15
Module 2	Group Euchordata II	15
Module 3	Group Euchordata III	15
Module 4	Type study: Shark	15

- Class Osteichthyes e.g. *Protopterus*, Catfish o Superclass Tetrapoda:
- Class Amphibia, e.g. *Alytes* and *Triton*
- Class Reptilia: e.g. *Varanus*, and crocodile

3. Class Aves: Examples: Penguin, Flamingo and Vulture

4. Class Mammalia: Examples: *Dasyurus* (Tiger cat), Flying Squirrel and *Gorilla*.

5. Study of Shark with the help of diagram / Photograph / Simulation whichever possible. No animal shall be dissected.

- a) Digestive system
- b) Heart and Aortic arches
- c) Urinogenital System
- d) Endoskeleton of shark:
 - i. Axial – Skull and vertebral column
 - ii. Appendicular – Pelvic and pectoral fins, pelvic and pectoral girdle

6. Visit to fish market / Aquarium / Zoo / National Park / Any other relevant place to observe chordates and prepare a report.

To develop scientific temper and interest by exposure through industrial visits and study/educational tours is recommended in each semester

PRACTICAL I

Unit	Topic	No. of Hours/Credits
	Zoology Practical-I	1.5 credits

Suggested Readings

1. Modern text book of Zoology – Vertebrates; Professor R.L. Kotpal; Rastogi publication; Third Edition 2012.
2. Vertebrate Zoology for Degree students; V. K. Agarwal; S. Chand Publication; 2012.
3. Fundamentals of Zoology, Dr. K. C. Ghosh and Dr. B. Manna, New Central book Agency (P) Ltd.
4. Chordate Zoology Volume II, Prof. N. Arumogam. Saras Publication.
5. Chordate Anatomy Mohan P. Arora, Himalaya Publishing House, First edition.
6. Chordate Zoology, E. L. Jordan, P.S. Verma, S. Chand & Company Ltd.
7. The life of Vertebrates; J.Z. Young; ELBS - Oxford University Press; Third edition, 2006
8. Textbook of chordate Zoology, Vol. II, G.S. Sandhu, H. Bhaskar; Campus Book International, First edition, 2005.
9. Introduction to Zoology – Vol II: K. K. Chaki, G. Kundu and S. Sarkar, New Crystal Book Agency.
10. URL for search on net: <https://www.amazon.com/Protozoology-Susheel-VilasNikam/dp/9350300044>
11. Chordate Zoology by E. L. Jordan and P. S. Verma, edition,2009, Chand publications
12. Chordate Zoology by P. S. Verma, edition,2009, Chand publications
13. Modern Textbook of Zoology Vertebrates by R.L. Kotpal, edition Jan 2015, Rastogi publications
14. Practical Zoology: Vertebrate, by S. S. Lal, 2015
15. A Textbook of Invertebrate Zoology & Cell Biology, by V. S. Kanwate, A. N. Kulkarni et al. ed. Alka Prakashan
16. The Animal Kingdom: An Elementary Textbook in Zoology; Specially Classified and Arranged for the Use of Science Classes, Schools and Colleges (Classic Reprint), by Ellis A. Davidson, Sept. 2015, Publisher: Forgotten Book.

ADDITIONAL READING

17. <http://faculty.collegeprep.org/~bernie/sciproject/project/Kingdoms/Animal%20Kingdom%20-%205/Local%20copy/classification/chordata.html>
18. <http://www.ucmp.berkeley.edu/chordata/chordata.html>
19. <http://animaldiversity.org/accounts/Chordata/>
20. <https://www.earthlife.net/inverts/chordata.html>
21. <http://www.nhc.ed.ac.uk/index.php?page=493.450>
22. <https://manoa.hawaii.edu/exploringourfluidearth/biological/invertebrates/phylumchordata>
23. <http://www.nhptv.org/wild/chordata.asp>
24. <https://www.shapeoflife.org/phylum-chordata-advanced>

**SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben
Jivanlal College of Commerce & Economics (AUTONOMOUS)**

Date: 19th October, 2020

To,
Member Secretary,
Academic Council,
Mithibai College (Autonomous),
Vile Parle- West

Subject: Agenda for Academic Council meeting scheduled on _____

Dear Member Secretary,

Kindly include the following agenda for the meeting of Academic Council scheduled for 27th October, 2020.

(Example- Agenda items to be in brief statements)

- i) To approve the format for submission of agenda, notes thereto and curriculum to Academic council
- ii) To confirm/ approve syllabus for _____
- iii) To confirm/ approve-----

Thanking you,

Yours Sincerely,
Head of _____

Recommended by :

Vice-Principal

and Approved by:

I/C Principal

DEPARTMENT OF _____

BOARD OF STUDIES – MEETING

Date - _____ 2020

Time: 2:00 PM

Online on MS Teams

AGENDA

- 1)
- 2)
- 3)
- 4)

**SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben
Jivanlal College of Commerce & Economics (AUTONOMOUS)**

RESOLUTION

At the online Board of Studies - _____ meeting held on _____ at _____ on MS Teams, it was resolved that –

- 1)
- 2)
- 3)
- 4)

S.No.	BOS Members	Signature
1	_____ – Chairperson	
2	Two subject experts outside the parent University: a) b)	
3	Vice-Chancellor -University of Mumbai nominee a)	
4	Representative from Industry a)	
5	Post-graduate meritorious alumnus a)	
6	Members of same faculty - a) b)	
7	Member appointed by Management a)	
8	Faculty members a)	

**SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben
Jivanlal College of Commerce & Economics (AUTONOMOUS)**

	b)	
	c)	
	d)	

MINUTES OF MEETING

S.No.	Agenda Item	Discussion
1.		
2.		
3.		
4.	Any other matter:	



Shri Vile Parle Kelavani Mandal's
**MITHIBAI COLLEGE OF ARTS, CHAUHAN INSTITUTE OF SCIENCE & AMRUTBEN
JIVANLAL COLLEGE OF COMMERCE AND ECONOMICS (AUTONOMOUS)**
*NAAC Reaccredited 'A' grade, CGPA: 3.57 (February 2016),
Granted under RUSA, FIST-DST & -Star College Scheme of DBT, Government of India,
Best College (2016-17), University of Mumbai*

Affiliated to the
UNIVERSITY OF MUMBAI

Program: B.Sc.

Course: USMAZO602

Semester VI

**Choice Based Credit System (CBCS) with effect from the
Academic year 2018-19**

PROGRAMME SPECIFIC OUTCOMES (PSO'S)

On completion of the B.Sc.- Zoology, the learners should be enriched with knowledge and be able to-

- PSO1:** _____
- PSO2:** _____
- PSO3:** _____
- PSO4:** _____
- PSO5:** _____
- PSO6:** _____
- PSO7:** _____
- PSO8:** _____

Preamble

Zoology has emerged as a progressive subject in the last decade with innovations in curricular designing and unique initiatives which attracted students, both from urban as well as rural colleges, in large numbers towards this subject. The fundamental challenge however, was to design curricula without dissections, the backbone of the subject. We Zoologists though are firmly against cruelty to animals and practice conservation, had to take it with a pinch of salt that the dead table fish from the market and pests were also banned for dissection. Use of ICT and simulation techniques is strongly recommended to replace the dissections using animals by virtual dissection.

Students may present a research project under the guidance of a teacher from their college or any other college or from the industry or may do so on their own which shall be evaluated by the examiners at the time of the practical examinations and that the performance shall be considered separately as additional optional credits, based on the free choice of student and if permitted by the authorities then the same could be transferred to the other / higher programs if desired.

Care has also been taken to include a unit on muscles which was much neglected so far in anatomy. Possibility cannot be ruled out that it may give further impetus to Zoology students to enter the career of Gym and Fitness. This niche of students shall have upper hand over other personnel in the fitness industry in passing international exams since they already have knowledge of physiology to a desired extent.

This syllabus is framed by incorporating inputs from all the members who represented teachers, students, rank holders, people from the industry and interdisciplinary background, scientists from India and abroad.

Evaluation Pattern

The performance of the learner will be evaluated in two components. The first component will be a Continuous Assessment with a weightage of 25% of total marks per course. The second component will be a Semester end Examination with a weightage of 75% of the total marks per course. The allocation of marks for the Continuous Assessment and Semester end Examinations is as shown below:

a) Details of Continuous Assessment (CA)

25% of the total marks per course:

Continuous Assessment	Details	Marks
Component 1 (CA-1)	Test /Assignment/Tutorial/ Visit/Project/ Presentation	15 marks
Component 2 (CA-2)	Test /Assignment/Tutorial/ Visit/Project/ Presentation	10 marks

b) Details of Semester End Examination

75% of the total marks per course. Duration of examination will be two and half hours.

Question Number	Description	Marks	Total Marks
Total Marks			75

Signature

HOD

Signature

Approved by Vice –Principal

Signature

Approved by Principal

**SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben
Jivanlal College of Commerce & Economics (AUTONOMOUS)**

Program: B.Sc. (2021-22)				Semester: VI	
Course: ENZYMOLOGY, HOMEOSTASIS, ENDOCRINOLOGY AND ANIMAL TISSUE CULTURE				Course Code: USMAZO602	
Teaching Scheme			Evaluation Scheme		
Lecture (Hours per week)	Practical (Hours per week)	Tutori al (Hours per week)	Credit	Continuous Assessment (CA) (Marks - 25)	Semester End Examinations (SEE) (Marks- 75 in Question Paper)
4	4	---	2.5+1.5=4	25	75
Learning Objectives:					
<ul style="list-style-type: none"> • To introduce to the learner the fundamental concepts of enzyme biochemistry and to enable the learner realize applications of enzymes in basic and applied sciences. • To introduce to the learner the concept of homeostasis-thermoregulation and osmoregulation • To introduce to the learner the details of endocrine glands and its disorders. • To introduce to the learner the fundamental concepts of tissue culture and guide them progressively to certain areas of animal tissue culture. 					
Course Outcomes:					
After completion of the course, learners would be able to:					
CO1: Understand fundamentals of enzyme structure, action and kinetics.					
CO2: Appreciate the enzyme assay procedures and the therapeutic applications of enzymes.					
CO3: Comprehend the adaptive responses of animals to environmental changes for their survival.					
CO4: Understand the types and secretions of endocrine glands and their functions.					
CO5: Understand the significance of tissue culture as a tool in specialized areas of research					
CO6: Appreciate its applications in various industries.					
Outline of Syllabus: (per session plan)					
Module	Description				No of Hours
1	<p><u>Enzymology</u> 1.1: Introduction and Nomenclature: Definition; concept of activation energy; nomenclature and classification (based on IUB – Enzyme Commission) of enzymes; chemical nature of enzyme, co-factors and co-enzymes.</p> <p>1.2: Enzyme Action and Kinetics: Mechanism; Factors affecting enzyme activity – substrate, pH and temperature. Derivation of Michaelis-Menten equation and Lineweaver-Burk plot; Concept and significance of K_m, V_{max} and K_{cat}.</p> <p>1.3: Enzyme Inhibition: Competitive and non-competitive inhibitors and their kinetics; therapeutic applications of enzyme inhibitors.</p> <p>1.4: Regulation of Enzyme Activity: Allosteric regulation and regulation by covalent modification of enzymes; Isozymes (LDH)</p> <p>1.5: Industrial applications of enzymes: Food and detergents</p>				15

2	<p><u>Homeostasis</u></p> <p>2.1: Homeostasis 2.1.1: External and internal environment; Acclimation and acclimatization. 2.1.2: Body clock – Circadian & Diurnal rhythm.</p> <p>2.2: Thermoregulation 2.2.1: Endothermy and ectothermy 2.2.2: Temperature balance: Heat production – shivering and non-shivering thermogenesis; Brown fat, Mechanisms of heat loss. 2.2.3: Adaptive response to temperature - daily torpor, hibernation, aestivation</p> <p>2.3: Osmotic and Ionic Regulation 2.3.1: Living in hypo-osmotic, hyper-osmotic and terrestrial environment – Water absorption, salt water ingestion and salt excretion, Salt glands, Metabolic water 2.3.2: Role of kidney in ionic regulation</p>	15
3	<p><u>Endocrinology</u></p> <p>3.1: General organization of mammalian endocrine system 3.2: Hormones: Classification, properties, mechanism of hormone action. 3.3: Histology, functions and disorders of the following endocrine glands:</p> <ul style="list-style-type: none"> • Pituitary • Thyroid • Parathyroid • Pancreas • Adrenal 	15
4	<p><u>Animal Tissue Culture</u></p> <p>4.1: Aseptic techniques 4.1.1: Sterilization – basic principles of sterilization, importance of sterility in cell culture 4.1.2: Sterile handling – swabbing, capping, flaming, handling bottles and flasks, pipetting, pouring.</p> <p>4.2: Culture media 4.2.1: Types of media – Natural and Artificial media 4.2.2: Balanced Salt Solutions</p>	15

**SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben
Jivanlal College of Commerce & Economics (AUTONOMOUS)**

	<p>4.2.3: Complete Media – amino acids, vitamins, salts, glucose, oxygen supplements, hormones and growth factors, antibiotics</p> <p>4.2.4: Factors influencing cell culture – surface tension and foaming, viscosity, temperature, osmolality, pH, CO₂, bicarbonate and O₂</p> <p>4.3: Advantages of tissue culture – control of the environment, <i>in vitro</i> modelling of <i>in vivo</i> conditions</p> <p>4.4: Limitations of tissue culture</p> <p>4.5: Culture techniques</p> <p>4.5.1: Preparation of cells / organs for culture</p> <p>4.5.2: Cover slip, Flask and Tube culture</p> <p>4.5.3: Primary and established cell lines</p> <p>4.5.4: Hybridoma technology</p>	
	Total	60
<p>PRACTICALS</p> <ol style="list-style-type: none"> 1. Effect of varying pH on activity of enzyme Acid Phosphatase 2. Effect of varying enzyme concentration on activity of enzyme Acid Phosphatase 3. Effect of varying substrate concentration on activity of enzyme Acid Phosphatase 4. Effect of inhibitor on the activity of enzyme Acid Phosphatase 5. Separation of LDH isozymes by agarose / polyacrylamide gel electrophoresis 6. Histology of glands: T.S. of pituitary, thyroid, parathyroid, pancreas, adrenal. 7. Instruments for tissue culture- Autoclave, Millipore filter, CO₂ incubator, Laminar air-flow. (Principle & use) 8. Packaging of glassware for tissue culture. 9. Aseptic transfer techniques. 10. Trypsinization and vital staining using Trypan blue stain. 		

**SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben
Jivanlal College of Commerce & Economics (AUTONOMOUS)**

Unit	Topic	No. of Hours/Credits
Module 1	Enzymology	15
Module 2	Homeostasis	15
Module 3	Endocrinology	15
Module 4	Animal Tissue Culture	15

To develop scientific temper and interest by exposure through industrial visits and study/educational tours is recommended in each semester

PRACTICAL II

Unit	Topic	No. of Hours/Credits
	Zoology Practical-II	1.5 credits

Suggested Readings

1. Comparative Animal Physiology; Knut Schmidt Nielson; Cambridge Press
2. Comparative Animal Physiology; Prosser and Brown
3. Comparative Animal Physiology; William S Hoar
4. Text book of Comparative Physiology; R Nagabhushanam, Ms Kodarkar, Sarojini R India Book House Pvt. Ltd.
5. Animal Physiology; N. Arumugam, A. Mariakuttikan; Saras Publication
6. Text book of Endocrinology; Williams
7. Textbook of Endocrinology Hardcover; Dharmalingam; 2010
8. Endocrinology; 6th Edition; Mac Hadley, Jon E. Levine
9. Bailey's textbook of histology Hardcover; Frederick R Bailey
10. Mechanisms of Body Functions; Second Edition; Dexter M. Easton; Prentice-Hall of India Pvt. Ltd., New Delhi; 1978
11. Culture of animal cells – A manual of basic technique; R. Ian Freshney; John Wiley and Sons Publications; 2005

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Jivanlal College of Commerce & Economics (AUTONOMOUS)**

12. Basic cell culture – A practical approach; J. M. Davis; Oxford University Press; Indian edition; 2005
13. Animal cell culture – Biotechnology Series: Vol.1; Bina Mishra, B. P. Mishra, Pran P. Bhat, P.N. Bhat; Studium Press (India) Pvt. Ltd; 2011
14. Animal cell culture – Concept and Applications; Shweta Sharma; Oxford book Company; 2012
15. Biotechnology of Animal Tissues; Dr. P.R. Yadav and Dr. Rajiv Tyagi; Discovery Publishing House, New Delhi; 2006

ADDITIONAL READING:

1. A textbook of Enzymes: Shailendra Singh; Campus Book International, New Delhi 2007.
2. Biochemical Adaptation: Mechanism and Process in Physiological Evolution: Peter W. Hochachka & George N. Somero, Oxford University Press.
3. Comparative Animal Physiology: P. C. Withers, Thomson Publishing Co.
4. Mammalian Endocrinology: Ashoke Kumar Boral. New Central Book Agency Ltd
5. Endocrinology-Hormones and Human Health: Prakash S. Lohar, MJP Publishers, Chennai. 2005
6. Biotechnology-an introduction: Second Edition: S. Ignacimuthu, s.j, Narosa Publications.
7. Animal Biotechnology: R. Sasidhara, MJP Publishers, Chennai. 2006

**SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben
Jivanlal College of Commerce & Economics (AUTONOMOUS)**

Date: 19th October, 2020

To,
Member Secretary,
Academic Council,
Mithibai College (Autonomous),
Vile Parle- West

Subject: Agenda for Academic Council meeting scheduled on _____

Dear Member Secretary,

Kindly include the following agenda for the meeting of Academic Council scheduled for 27th October, 2020.

(Example- Agenda items to be in brief statements)

- i) To approve the format for submission of agenda, notes thereto and curriculum to Academic council
- ii) To confirm/ approve syllabus for _____
- iii) To confirm/ approve-----

Thanking you,

Yours Sincerely,
Head of _____

Recommended by:

Vice-Principal

and Approved by:

I/C Principal

DEPARTMENT OF _____

BOARD OF STUDIES – MEETING

Date - _____ 2020

Time: 2:00 PM

Online on MS Teams

AGENDA

- 1)
- 2)
- 3)
- 4)

**SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben
Jivanlal College of Commerce & Economics (AUTONOMOUS)**

RESOLUTION

At the online Board of Studies - _____ meeting held on _____ at _____ on MS Teams, it was resolved that –

- 1)
- 2)
- 3)
- 4)

S.No.	BOS Members	Signature
1	_____ – Chairperson	
2	Two subject experts outside the parent University: a) b)	
3	Vice-Chancellor -University of Mumbai nominee a)	
4	Representative from Industry a)	
5	Post-graduate meritorious alumnus a)	
6	Members of same faculty - a) b)	
7	Member appointed by Management a)	
8	Faculty members a)	

**SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben
Jivanlal College of Commerce & Economics (AUTONOMOUS)**

	b)	
	c)	
	d)	

MINUTES OF MEETING

S.No.	Agenda Item	Discussion
1.		
2.		
3.		
4.	Any other matter:	



Shri Vile Parle Kelavani Mandal's
**MITHIBAI COLLEGE OF ARTS, CHAUHAN INSTITUTE OF SCIENCE & AMRUTBE
JIVANLAL COLLEGE OF COMMERCE AND ECONOMICS (AUTONOMOUS)**
*NAAC Reaccredited 'A' grade, CGPA: 3.57 (February 2016),
Granted under RUSA, FIST-DST & -Star College Scheme of DBT, Government of India,
Best College (2016-17), University of Mumbai*

Affiliated to the
UNIVERSITY OF MUMBAI

Program: B.Sc.

Course: USMAZO603

Semester VI

**Choice Based Credit System (CBCS) with effect from the
Academic year 2018-19**

PROGRAMME SPECIFIC OUTCOMES (PSO'S)

On completion of the B.Sc.- Zoology, the learners should be enriched with knowledge and be able to-

- PSO1:** _____
- PSO2:** _____
- PSO3:** _____
- PSO4:** _____
- PSO5:** _____
- PSO6:** _____
- PSO7:** _____
- PSO8:** _____

Preamble

Zoology has emerged as a progressive subject in the last decade with innovations in curricular designing and unique initiatives which attracted students, both from urban as well as rural colleges, in large numbers towards this subject. The fundamental challenge however, was to design curricula without dissections, the backbone of the subject. We Zoologists though are firmly against cruelty to animals and practice conservation, had to take it with a pinch of salt that the dead table fish from the market and pests were also banned for dissection. Use of ICT and simulation techniques is strongly recommended to replace the dissections using animals by virtual dissection.

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25% of the total marks per course:

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b) Details of Semester End Examination

75% of the total marks per course. Duration of examination will be two and half hours.

Question Number	Description	Marks	Total Marks
Total Marks			75

Signature

Signature

Signature

HOD

Approved by Vice –Principal

Approved by Principal

**SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben
Jivanlal College of Commerce & Economics (AUTONOMOUS)**

Program: B.Sc. (2021-22)				Semester: VI	
Course: MOLECULAR BIOLOGY, GENETIC ENGINEERING, HUMAN GENETICS AND BIOINFORMATICS				Course Code: USMAZO603	
Teaching Scheme			Evaluation Scheme		
Lecture (Hours per week)	Practical (Hours per week)	Tutori al (Hours per week)	Credit	Continuous Assessment (CA) (Marks - 25)	Semester End Examinations (SEE) (Marks- 75 in Question Paper)
4	4	---	2.5+1.5=4	25	75
Learning Objectives:					
<ul style="list-style-type: none"> • To introduce learner to chemical and molecular processes that affect genetic material. • To make learner understand the concept of DNA damage and repair, and how gene control is necessary for cell survival. • To introduce learner to a set of techniques to modify an organism's genome to produce improved or novel genes and organisms. • To introduce learner with genetic alterations in human genome and their diagnosis. • To introduce learner to bioinformatics – a computational approach to learning the structure and organization of genomes, phylogeny and metabolism. 					
Course Outcomes:					
After completion of the course, learners would be able to:					
CO1: Get an insight into the intricacies of chemical and molecular processes that affect genetic material.					
CO2: Prepare learner to recognize the significance of molecular biology as a basis for the study of other areas of biology and biochemistry.					
CO3: Understand related areas in relatively new fields of genetic engineering and biotechnology.					
CO4: Get acquainted with the vast array of techniques used to manipulate genes which can be applied in numerous fields like medicine, research, etc. for human benefit.					
CO5: Become aware of the impact of changes occurring at gene level on human health and its diagnosis.					
CO6: Become aware of the computational point of view of studying the genomes.					
Outline of Syllabus: (per session plan)					
Module	Description				No of Hours
1	<p><u>Molecular Biology</u> 1.1: Types of mutation 1.1.1: Point mutations – substitution, deletion and insertion mutations</p> <p style="padding-left: 40px;">Substitution mutations – silent (same-sense), missense and nonsense mutations, transition and transversion</p> <p style="padding-left: 40px;">Deletion and Insertion mutations – frameshift mutations</p> 1.1.2: Trinucleotide repeat expansions – fragile X syndrome, Huntington disease 1.1.3: Spontaneous mutation – tautomeric shifts, spontaneous lesions				15

	<p>1.2: Induced mutations 1.2.1: Physical agents:</p> <ul style="list-style-type: none"> • Ionizing radiation (X-rays, α, β and γ rays) • Non-ionizing radiation (UV light) <p>1.2.2: Chemical agents:</p> <ul style="list-style-type: none"> • Base analogs (5-bromouracil) • Intercalating agents (ethidium bromide) • Deaminating agents (nitrous acid) • Hydroxylating agents (hydroxylamine) • Alkylating agents (mustard gas) • Aflatoxin (aflatoxin B1) <p>1.3: Preventative and repair mechanisms for DNA damage 1.3.1: Mechanisms that prevent DNA damage – superoxide dismutase and catalase 1.3.2: Mechanisms that repair damaged DNA – direct DNA repair (alkyl transferases, photoreactivation, excision repair) 1.3.3: Post replication repair – recombination repair, mismatch repair, SOS repair</p> <p>1.4: Eukaryotic gene expression 1.4.1: Regulatory protein domains– zinc fingers, helix-turn-helix domain and leucine zipper 1.4.2: DNA methylation</p>	
2	<p><u>Genetic Engineering</u> 2.1: Tools in Genetic Engineering 2.1.1: Enzymes involved in Genetic Engineering: Introduction, nomenclature and types of restriction enzymes with examples, Ligases – E.coli DNA ligase, T4 DNA ligase, polynucleotide kinase, phosphatases, DNA polymerases, reverse transcriptase, terminal transferase</p> <p>2.1.2: Vectors for gene cloning: General properties, advantages and disadvantages of cloning vectors - plasmid vectors (pBR322), phage vectors (λ Phage), cosmid vectors (c2XB)</p> <p>2.1.3: Cloning techniques: Cloning after restriction digestion - blunt and cohesive end ligation, creation of restriction sites using linkers and adapters, cloning after homopolymer tailing, cDNA synthesis (Reverse transcription), genomic and cDNA libraries</p> <p>2.2: Techniques in Genetic Engineering</p>	15

**SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben
Jivanlal College of Commerce & Economics (AUTONOMOUS)**

	<p>2.2.1: PCR techniques: Principle of polymerase chain reaction (PCR), Applications of PCR</p> <p>2.2.2: Sequencing techniques: DNA sequencing: Maxam-Gilbert method, Sanger's method Protein sequencing: Sanger's method, Edman's method Applications of sequencing techniques</p> <p>2.2.3: Detection techniques: Blotting techniques – Southern blotting, Northern blotting and Western blotting Applications of blotting techniques</p>	
3	<p><u>Human Genetics</u></p> <p>3.1: Non-disjunction during mitosis and meiosis</p> <p>3.1.1: Chromosomal Aberrations: Structural: Deletion: types, effects and disorders; Translocation: types: Robertsonian and non-Robertsonian disorders;</p> <p style="padding-left: 40px;">Inversion: types, effects and significance;</p> <p style="padding-left: 40px;">Duplication and their evolutionary significance (multigene families)</p> <p style="padding-left: 40px;">Numerical: Aneuploidy and Polyploidy (Autopolyploidy and Allopolyploidy)</p> <p>3.2: Genetic Disorders</p> <p>3.2.1: Inborn Errors of Metabolism: Phenylketonuria, G-6-PD deficiency, Alkaptonuria, Albinism</p> <p>3.2.2: Single gene mutation: Cystic fibrosis</p> <p>3.2.3: Multifactorial: Breast Cancer</p> <p>3.2.4: Uniparental Disomy: Angelman Syndrome and Prader-Willi Syndrome</p> <p>3.3: Diagnosis</p> <p>3.3.1: Prenatal Diagnosis: Amniocentesis and Chorionic villus sampling, Banding techniques (G, C, Q), FISH, Protein truncation test (PTT),</p> <p>3.3.2: Genetic counselling</p>	15
4	<p><u>Bioinformatics</u></p> <p>4.1: Introduction</p> <p>4.1.1: Introduction to Bioinformatics and Bioinformatics web resource (NCBI, EBI, OMIM, PubMed)</p> <p>4.1.2: Applications of Bioinformatics</p> <p>4.2: Databases – Tools and their uses</p> <p>4.2.1: Biological databases;</p> <p style="padding-left: 40px;">Primary sequence databases: Nucleic acid sequence databases (GenBank, EMBLEBI, DDBJ) Protein sequence databases (UniProtKB, PIR)</p> <p style="padding-left: 40px;">Secondary sequence databases</p>	15

	<p>Derived databases - PROSITE, BLOCKS, Structure databases and bibliographic databases High wire Sci Direct</p> <p>4.3: Sequence alignment methods 4.3.1: BLAST, FASTA 4.3.2: Types of sequence alignment (Pairwise & Multiple sequence alignment) 4.3.3: Significance of sequence alignment</p> <p>4.4: Predictive applications using DNA and protein sequences 4.4.1: Evolutionary studies: Concept of phylogenetic tree, convergent and parallel evolution 4.4.2: Pharmacogenomics: Discovering a drug: Target identification 4.4.3: Protein Chips and Functional Proteomics: Different types of protein chip (detecting and quantifying), applications of Proteomics 4.4.4: Metabolomics: Concept and applications</p>	
	Total	60
PRACTICALS		
<ol style="list-style-type: none"> 1. Quantitative Estimation of RNA by Orcinol method. 2. Quantitative Estimation of DNA by Diphenylamine method. 3. Separation of Genomic DNA by Agarose gel electrophoresis. 4. Colorimetric estimation of proteins from given sample by Folin-Lowry's method. 5. Problems based on Restriction endonucleases. 6. Karyotype (Idiogram) analysis for the following syndromes with comments on numerical &/or structural variations in chromosomes (no cutting of chromosomes): <ol style="list-style-type: none"> a. Turner's syndrome b. Klinefelter's syndrome c. Down's syndrome d. Cri-du-chat syndrome e. D-G translocation f. Edward's syndrome g. Patau's syndrome 7. Interpretation of genetic formulae: Deletion, duplication, inversion and translocation. 8. Calculation of mitotic index from the photograph or stained preparation of onion root tip or cancer cells. 9. Explore BLAST for nucleotide sequence comparison. 10. Explore the databases (Nucleotide, Protein) at NCBI for querying a nucleotide or protein sequence. 11. Exploring bibliographic database PubMed for downloading a research paper on subject of interest with the use of operators. 		

Unit	Topic	No. of Hours/Credits
Module 1	Molecular Biology	15
Module 2	Genetic Engineering	15
Module 3	Human Genetics	15
Module 4	Bioinformatics	15

To develop scientific temper and interest by exposure through industrial visits and study/educational tours is recommended in each semester

PRACTICAL III

Unit	Topic	No. of Hours/Credits
	Zoology Practical-III	1.5 credits

Suggested Readings

1. Genetics – The continuity of life; Daniel Fairbanks and Ralph Andersen; Brooks/ Cole Publishing Company; 1999
2. Introduction to Molecular Biology; Peter Paoletta; Tata McGraw Hill; 2010
3. Molecular Biology; David Freifelder; Narosa Publishing House; 2008
4. Genetics; Robert Weaver and Philip Hedrick; McGraw Hill; 2001
5. Genetics – A Molecular Approach; Third Edition; Peter J. Russell; Pearson Education, Inc. (Benjamin Cummings), San Francisco; 2010
6. Molecular Biology – Academic Cell Update; Update Edition; David Clark; Elsevier, Inc.; 2010
7. Genetics; M.W. Farnsworth; Harper and Row Publishers, Inc., USA; 1978
8. Principles of Genetics; Eighth Edition; Gardner, Simmons and Snustad; John Wiley and Sons (Asia) Pte. Ltd., Singapore; 2002

**SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben
Jivanlal College of Commerce & Economics (AUTONOMOUS)**

9. The Science of Genetics – An Introduction to Heredity; Fourth Edition; George W. Burns; Macmillan Publishing Co., Inc., New York; 1980
10. Molecular Biology – Bios Instant Notes; Fourth Edition; Alexander McLennan, Andy Bates, Phil Turner & Mike White; Garland Science; 2013
11. <https://www.ncbi.nlm.nih.gov/books/>
12. Current Protocols in Molecular Biology; Frederick M. Ausubel, Roger Brent, Robert E. Kingston, David D. Moore, Seidman J. G., John A. Smith and Kevin Struhl; John Wiley & Son, Inc.; 2003
13. Introduction to Proteomics; Daniel C. Liebler; Humana Press; 2002
14. Molecular cloning; Joseph Sambrook, David William Russell; Third Edition; CSHL Press; 2001
15. Gene Cloning – An Introduction; Brown .T.A; Fourth Edition; Wiley-Blackwell; 2011
16. Recombinant DNA - Genes and Genomes- A short course; 3rd Edition; Watson, J.D., Myers, R.M., Caudy A., Witkowski, J.K.; Freeman and Co. NY; 2007
17. Principles Of Gene Manipulation & Genomics; Primrose SB and R. Twyman; Blackwell Science Publications; 2006
18. Methods In Enzymology, Vol 152; Berger SI, Kimmer AR; Academic Press; 1987
19. Genomes 3; Third Edition; T.A.Brown; Garland Science Publishing; 2007
20. Molecular Biotechnology - Principles and applications of recombinant DNA; Glick, B.R. and Pasternak, J. J.; ASM press, Washington; 2010
21. Microbiology; Fifth Edition; Pelczar, M.J. et al; Tata McGraw-Hill Co., New Delhi; 2001
22. Introduction to Protein Structure; Second Edition; Branden C. and Tooze J.; Garland Publishing; 1999
23. Proteins; Second Edition; Creighton T.E.; W.H. Freeman; 1993
24. Proteomics - Protein Sequence to Function; Pennington, S.R and M.J. Dunn; Viva Books; 2002
25. Genetic engineering – Principles and Practice; Sandhya Mitra; Macmillan India Ltd., New Delhi
26. Biotechnology – Fundamentals and Applications; Third Enlarged Edition; S.S. Purohit; Student Edition, Jodhpur; 2005
27. Biotechnology – Expanding Horizons; B.D.Singh; Kalyani Publishers, Ludhiana
28. A textbook of Biotechnology; R.C.Dubey; S.Chand and Company Ltd., New Delhi
29. Cell and Molecular Biology; Eighth Edition; E.D.P. De Robertis, E.M.F. De Robertis Jr.; Info-Med Ltd.; 1988
30. Genetics (Bios Instant Notes); Third Edition; G.I. Hickey, H.L. Fletcher and P. Winter; Taylor and Francis Group, New York; 2007
31. Genetics – A Conceptual Approach; Third Edition; Benjamin A. Pierce; W.H. Freeman and Company, New York; 2008
32. New Clinical Genetics; Second Edition; Andrew Read and Dian Donnai; Scion Publishing Ltd., UK; 2011
33. Genetics; Third Edition; Robert F. Weaver and Philip W. Hedrick; Wm. C. Brown Publishers (The McGraw-Hill Companies, Inc.); 1997
34. Human Molecular Genetics; Fourth Edition; Tom Strachan and Andrew Read; Garland Science, USA; 2011
35. Genetics; M.W. Farnsworth; Harper and Row Publishers, Inc., USA; 1978
36. Human Genetics – An Overview; Alice Marcus; Narosa Publishing House; 2010
37. The Science of Genetics – An Introduction to Heredity; Fourth Edition; George W. Burns; Macmillan Publishing Co., Inc., New York; 1980

<https://www.ncbi.nlm.nih.gov/books/>

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1. <https://ghr.nlm.nih.gov/>
2. Bioinformatics - Concepts, Skills, and Applications; S.C. Rastogi & others; CBS Publishing; 2003
3. Bioinformatics - A practical guide to analysis of Genes & Proteins; Andreas D Baxevanis & B F Francis; John Wiley; 2000
4. Introduction to Bioinformatics; 1st Edition; T K Attwood, D J parry-Smith; Pearson Education, 11th Reprint; 2005
5. Bioinformatics; 1st Edition; C S V Murthy; Himalaya Publishing House; 2003
6. Bioinformatics sequence and genome analysis; David W. Mount; Cold spring harbor laboratory press; 2004
7. Basic Bioinformatics; S. Ignacimuthu, S.J.; Narosa Publishing House; 1995
8. An Introduction to Bioinformatics Algorithms; Neil C. Jones and Pavel A. Pevzner; MIT Press, First Indian Reprint; 2005
9. Bioinformatics - Managing Scientific Data; Zoe Lacroix, Terence Critchlow; Morgan Kaufmann Publishers (Elsevier Science); 2003 (for the V unit)
10. Phylogenetics: Theory and Practice of Phylogenetic Systematics; Second edition; Bruce S. Lieberman; Wiley-Blackwell; 2011
11. Molecular Evolution: A Phylogenetic Approach; Roderick D.M. Page, Dr Edward C. Holmes; Well Publishing; 1998
12. Essential Bioinformatics; JinXiong; Cambridge University Press; 2006
13. Proteomics - From Protein Sequence to Function; 12 S. R. Pennington, M. J. Dunn; First edition; Springer publications; 2001
14. Proteomics; Timothy Palzkill; Springer; 2002
15. Metabolomics - A Powerful Tool in Systems Biology; Jens Hfiriis Nielsen, Michael C. Jewett; Springer; 2007
16. Systems Metabolic Engineering; Dr. Christoph Wittmann, Sang Yup. Lee; Springer; 2012 □ Bioinformatics (Bios Instant Notes); Second Edition (Special Indian Edition); T. Charlie Hodgman, Andrew French and David R. Westhead; Garland Science (Taylor and Francis Group); 2010
17. Understanding Bioinformatics; Marketa Zvelebil and Jeremy O. Baum; Garland Science (Taylor and Francis Group); 2008
18. Bioinformatics Computing – The complete practical guide to bioinformatics for life scientists; Bryan Bergeron; Eastern Economy Edition; Prentice-Hall of India Pvt. Ltd., New Delhi; 2003
19. Bioinformatics; Prakash S. Lohar; MJP Publishers, Chennai; 2009
20. Introduction to Bioinformatics; First Edition; S. SundaraRajan and R. Balaji; Himalaya Publishing House, Mumbai; 2002
21. Molecular Biology – Bios Instant Notes; Fourth Edition; Alexander McLennan, Andy Bates, Phil Turner & Mike White; Garland Science; 2013

ADDITIONAL READING

22. The Gene: An Intimate History; Siddhartha Mukherjee; Scribner, New York; 2016
23. The Handling of Chromosomes; Sixth Edition; C.D. Darlington & L.F. La Cour; George Allen & Unwin Ltd., London; 1976
24. Molecular Cell Biology; Fifth edition; Harvey Lodish, Arnold Berk, Paul Matsudaira, Chris A. Kaiser, Monty Krieger, Matthew P. Scott, S. Lawrence Zipursky & James Darnell; W.H. Freeman & Company, New York; 2004

**SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben
Jivanlal College of Commerce & Economics (AUTONOMOUS)**

Date: 19th October, 2020

To,
Member Secretary,
Academic Council,
Mithibai College (Autonomous),
Vile Parle- West

Subject: Agenda for Academic Council meeting scheduled on _____

Dear Member Secretary,

Kindly include the following agenda for the meeting of Academic Council scheduled for 27th October, 2020.

(Example- Agenda items to be in brief statements)

- i) To approve the format for submission of agenda, notes thereto and curriculum to Academic council
- ii) To confirm/ approve syllabus for _____
- iii) To confirm/ approve-----

Thanking you,

Yours Sincerely,
Head of _____

Recommended by :

Vice-Principal

and Approved by:

I/C Principal

DEPARTMENT OF _____

BOARD OF STUDIES – MEETING

Date - _____ 2020

Time: 2:00 PM

Online on MS Teams

AGENDA

- 1)
- 2)
- 3)
- 4)

**SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben
Jivanlal College of Commerce & Economics (AUTONOMOUS)**

RESOLUTION

At the online Board of Studies - _____ meeting held on _____ at _____ on MS Teams, it was resolved that –

- 1)
- 2)
- 3)
- 4)

S.No.	BOS Members	Signature
1	_____ – Chairperson	
2	Two subject experts outside the parent University: a) b)	
3	Vice-Chancellor -University of Mumbai nominee a)	
4	Representative from Industry a)	
5	Post-graduate meritorious alumnus a)	
6	Members of same faculty - a) b)	
7	Member appointed by Management a)	
8	Faculty members a)	

**SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben
Jivanlal College of Commerce & Economics (AUTONOMOUS)**

	b)	
	c)	
	d)	

MINUTES OF MEETING

S.No.	Agenda Item	Discussion
1.		
2.		
3.		
4.	Any other matter:	

SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben
Jivanlal College of Commerce & Economics (AUTONOMOUS)



Shri Vile Parle Kelavani Mandal's
**MITHIBAI COLLEGE OF ARTS, CHAUHAN INSTITUTE OF SCIENCE & AMRUTBE
JIVANLAL COLLEGE OF COMMERCE AND ECONOMICS (AUTONOMOUS)**
*NAAC Reaccredited 'A' grade, CGPA: 3.57 (February 2016),
Granted under RUSA, FIST-DST & -Star College Scheme of DBT, Government of India,
Best College (2016-17), University of Mumbai*

Affiliated to the
UNIVERSITY OF MUMBAI

Program: B.Sc.

Course: USMAZO604

Semester VI

**Choice Based Credit System (CBCS) with effect from the
Academic year 2018-19**

PROGRAMME SPECIFIC OUTCOMES (PSO'S)

On completion of the B.Sc.- Zoology, the learners should be enriched with knowledge and be able to-

- PSO1:** _____
- PSO2:** _____
- PSO3:** _____
- PSO4:** _____
- PSO5:** _____
- PSO6:** _____
- PSO7:** _____
- PSO8:** _____

Preamble

Zoology has emerged as a progressive subject in the last decade with innovations in curricular designing and unique initiatives which attracted students, both from urban as well as rural colleges, in large numbers towards this subject. The fundamental challenge however, was to design curricula without dissections, the backbone of the subject. We Zoologists though are firmly against cruelty to animals and practice conservation, had to take it with a pinch of salt that the dead table fish from the market and pests were also banned for dissection. Use of ICT and simulation techniques is strongly recommended to replace the dissections using animals by virtual dissection.

Students may present a research project under the guidance of a teacher from their college or any other college or from the industry or may do so on their own which shall be evaluated by the examiners at the time of the practical examinations and that the performance shall be considered separately as additional optional credits, based on the free choice of student and if permitted by the authorities then the same could be transferred to the other / higher programs if desired.

Care has also been taken to include a unit on muscles which was much neglected so far in anatomy. Possibility cannot be ruled out that it may give further impetus to Zoology students to enter the career of Gym and Fitness. This niche of students shall have upper hand over other personnel in the fitness industry in passing international exams since they already have knowledge of physiology to a desired extent.

This syllabus is framed by incorporating inputs from all the members who represented teachers, students, rank holders, people from the industry and interdisciplinary background, scientists from India and abroad.

Evaluation Pattern

The performance of the learner will be evaluated in two components. The first component will be a Continuous Assessment with a weightage of 25% of total marks per course. The second component will be a Semester end Examination with a weightage of 75% of the total marks per course. The allocation of marks for the Continuous Assessment and Semester end Examinations is as shown below:

a) Details of Continuous Assessment (CA)

25% of the total marks per course:

Continuous Assessment	Details	Marks
Component 1 (CA-1)	Test /Assignment/Tutorial/ Visit/Project/ Presentation	15 marks
Component 2 (CA-2)	Test /Assignment/Tutorial/ Visit/Project/ Presentation	10 marks

b) Details of Semester End Examination

75% of the total marks per course. Duration of examination will be two and half hours.

Question Number	Description	Marks	Total Marks
Total Marks			75

Signature

HOD

Signature

Approved by Vice –Principal

Signature

Approved by Principal

SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben
Jivanlal College of Commerce & Economics (AUTONOMOUS)

Program: B.Sc. (2021-22)				Semester: VI	
Course: ENVIRONMENT AND WILDLIFE MANAGEMENT, APPRECIATING SCIENTIFIC WRITING AND ZOOGEOGRAPHY				Course Code: USMAZO604	
Teaching Scheme			Evaluation Scheme		
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Continuous Assessment (CA) (Marks - 25)	Semester End Examinations (SEE) (Marks- 75 in Question Paper)
4	4	---	2.5+1.5=4	25	75
Learning Objectives:					
<ul style="list-style-type: none"> • Learner should understand different factors affecting the environment and various methods to improve environmental stewardship. • To sensitize learner regarding the various threats to the wildlife • To introduce learner various ways that can help in the protection, conservation, management, and enhancement of wildlife populations and habitat. • To introduce the learner to the concepts of research documents. • To introduce learner to the geographic distribution (present and past) of animal species. • To introduce learner to various ways by which animals distributed. 					
Course Outcomes:					
After completion of the course, learners would be able to:					
CO1: Understand the different factors affecting environment, its impact and environment management laws.					
CO2: Understand various methods for wildlife conservation.					
CO3: Apply knowledge to overcome the issues related to wildlife conservation and management.					
CO4: Be made aware of latest research going on in various fields of the subject.					
CO5: Be acquainted with scientific writing, style of research papers, methods of presentation of research paper as well as to review and appreciate to work of others.					
CO6: Become acquainted with how and why different animal species are distributed around the globe.					
Outline of Syllabus: (per session plan)					
Module	Description				No of Hours
1	<u>Environment Management</u> 1.1: Natural resources and their Classification 1.1.1: Forest resources, water resources (surface and ground) and mineral resources 1.1.2: Energy resources: renewable and non-renewable resources. 1.2: Exploitation and Modification of Natural Resources: Impact on climate, flora and fauna 1.3: Waste Management 1.3.1: 3R's (Reduce, Reuse and Recycle) of solid waste management. 1.3.2: e-waste and hazardous waste (biological, chemical, medical and nuclear) management 1.3.3: Recent technology in solid waste management:				15

	<p>a) Traditional methods for solid waste management: Composting, Incineration, Landfill Recycling, Windrow composting</p> <p>b) Modern methods for solid waste management: Anaerobic digestion, ethanol production, biodrying, pyrolysis, Upflow anaerobic sludge blanket (UASB) technology, waste autoclave</p> <p>1.4: Water management 1.4.1: Rainwater harvesting: Definition ways of harvesting, components, model of rain water harvesting: Rural and Urban, Advantages and disadvantages</p> <p>1.4.2: Watershed management: Definition, need and objectives, classification (mini, micro, mili, sub-watershed, macro-watershed), Watershed management practices: Contour, gully control, stone bunds. Growing greenery and integrated watershed approach (IWA).</p> <p>1.4.3: Case study: Ice-stupa artificial glaciers by Sonam Wangchuk</p> <p>1.4.4: Effluent treatment, recycling plants, control and treatment of sewage water.</p> <p>1.5: Acts and Rules of Environment Management 1.5.1: Environment Protection Act – 1986, Air (Prevention and Control of Pollution) Act – 1981, Water (Prevention and Control of Pollution) Act – 1974</p> <p>1.5.2: Hazardous Wastes (Management and Handling) Rules – 1989</p> <p>1.5.3: EIA (Environmental Impact Assessment)</p> <p>1.5.4: Role of Central and State Government (Pollution Control Board) and NGOs</p>	
2	<p><u>Wildlife Management</u> 2.1: Habit, Habitat, Territory and Niche of Wild Animals: Herbivores, carnivores, solitary, social (flock, pod, community), pack and herd, types of habitats and territories, niche concept</p> <p>2.2: Threats to Wildlife 2.2.1: Poaching and hunting, deforestation, encroachment, competition (intra-specific and inter-specific), overgrazing and climate change, diseases (zoonosis and reverse zoonosis)</p> <p>2.2.2: Tourism and human animal conflict</p> <p>2.3: Wildlife Conservation 2.3.1: Techniques and methods used for wildlife census: Aerial counts, camera trap, line transect census and track surveys, capture mark recapture method, wildlife radio telemetry</p>	15

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Jivanlal College of Commerce & Economics (AUTONOMOUS)**

	<p>2.3.2: Forest management, policies and Acts: Harvesting Trees, Thinning harvest, Clearcut Harvest, Shelterwood harvest, Seed tree harvest, Group selection harvest, Single-tree selection harvest, Prescribed burning, Reforestation</p> <p>2.3.3: Forest policy 1894, 1952, 1988; The Indian Forest Act, 1927; Forest (Conservation) Act, 1980.</p>	
3	Appreciating scientific writing, research paper, conference presentation and reviews	15
4	<p>Zoogeography</p> <p>4.1: Introduction: Plate tectonics and continental drift theory</p> <p>4.2: Animal Distribution and Barriers</p> <p>4.2.1: Patterns of animal distribution – continuous, discontinuous, isolation and bipolarity</p> <p>4.2.2: Barriers of distribution –Topographic, climatic, vegetative, large water masses, land mass, lack of salinity and special characteristic habit (homing instinct).</p> <p>4.2.3: Means of dispersal – land bridges, natural rafts and drift wood, favouring gales, migration by host, accidental transportation and by human agencies</p> <p>4.3: Zoogeographical Realms: Palearctic, Ethiopian, Oriental, Australian, Neotropical, Nearctic and Antarctic</p>	15
	Total	60
PRACTICALS		
<ol style="list-style-type: none"> 1. Estimation of phosphates from sample water. 2. Estimation of BOD from sample water. 3. Estimation of COD from sample water. 4. Estimation of Nitrates from sample water. 5. Estimation of acidity and alkalinity of sample water by methyl orange and phenolphthalein indicator. 6. Comparative study of sound intensity in different places by Decibel meter. 7. Indicate the distribution of fauna in the world map w.r.t. to its realm and comment on the pattern of distribution. <ol style="list-style-type: none"> a. Palearctic: Giant Panda and Japanese Macaque b. Ethiopian: Common ostrich and African bush elephant c. Oriental: Indian one-horned Rhinoceros and Gharial d. Australian: Platypus and Red Kangaroo e. Neotropical: Guanaco and South American Tapir f. Nearctic: Virginia opossum and Sea otter g. Antarctic: Emperor Penguin and Antarctic Minke Whale 8. Long Excursion (Study tour / Visit) to Zoo / Sanctuary / National park / Research institute and submit report. 		

Unit	Topic	No. of Hours/Credits
Module 1	Environment Management	15
Module 2	Wildlife Management	15
Module 3	Appreciating scientific writing, research paper, conference presentation and reviews	15
Module 4	Zoogeography	15

To develop scientific temper and interest by exposure through industrial visits and study/educational tours is recommended in each semester

PRACTICAL IV

Unit	Topic	No. of Hours/Credits
	Zoology Practical-IV	1.5 credits

Suggested Readings

1. Essentials of Environmental Science; N. Vasudevan; Narosa Publishing House Pvt. Ltd. New Delhi 110002
2. Environmental Biology; P.S Verma, V.K Agarwal; S. Chand & company Ltd. New Delhi 110055
3. A textbook of Environmental Science; Arvind Kumar; A P H Publishing Corporation
4. New Delhi 110002
5. Environmental Biotechnology - Basic Concepts and Application; Indu Shekhar Thakur; I. K. International Pvt. Ltd. New Delhi 110016
6. Text book of environmental science; S. C. Santra
7. Wild life management; Rajesh Gopal

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8. Wildlife Management and Conservation - Contemporary Principles and Practices; Paul R. Krausman and James W. Cain III
9. Wildlife Ecology, Conservation, and Management; John M. Fryxell, Anthony R. E. Sinclair, Graeme Caughley
10. Zoogeography – The Geographical Distribution of Animals; Philip J. Darlington JR;
11. Academic Publishers, Kolkata
12. Animal Geography - Newbegin
13. Vertebrate Paleontology - Romer
14. Ecological animal geography- Allee, Park and Schmidt
15. Zoogeography of India and South East Asia - Dr. S. K. Tiwari; CBS Publishers and Distributors, Delhi; 1985

ADDITIONAL READING

16. Environmental Management: Principles and Practice by Christopher J. Barrow - □
Introduction to Environmental Management by Mary K. Theodore and Louis Theodore □
Effective Environmental Management: Principles and Case Studies by Rory Sullivan and Hugh Wyndham
17. Solid Waste Management: Principles and Practice by Ramesha Chandrappa, Diganta Bhusan Das
18. Solid Waste Management: An Indian Perspective by M. S. Bhatt and Asheref Illiyan
19. Solid Waste Management by Subhash Anand
20. Watershed Management by Vijay P. Singh and Ram Narayan Yadava
21. Watershed Management by J. V. S. Murty
22. Water Resources, Conservation and Management by S.N. Chatterjee
23. Watershed Management – By Madan Mohan Das, Mimi Das Saikia
24. Concepts in Wildlife Management by B. B. Hosetti
25. Wildlife Management Practices by James Durell
26. Wildlife: management and conservation by M. M. Ranga
27. Ecological Census Techniques: A Handbook By William J. Sutherland - 2006
28. CRC Handbook of Census Methods for Terrestrial Vertebrates by Davis
29. Selecting Wildlife Census by R. F. H. Collinson
30. Forest Measurements: Fifth Edition by Thomas Eugene Avery and Harold E. Burkhardt
31. Techniques for wildlife investigations and management by Clait E. Braun, Wildlife Society

**SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben
Jivanlal College of Commerce & Economics (AUTONOMOUS)**

Date: 19th October, 2020

To,
Member Secretary,
Academic Council,
Mithibai College (Autonomous),
Vile Parle- West

Subject: Agenda for Academic Council meeting scheduled on _____

Dear Member Secretary,

Kindly include the following agenda for the meeting of Academic Council scheduled for 27th October, 2020.

(Example- Agenda items to be in brief statements)

- i) To approve the format for submission of agenda, notes thereto and curriculum to Academic council
- ii) To confirm/ approve syllabus for _____
- iii) To confirm/ approve-----

Thanking you,

Yours Sincerely,
Head of _____

Recommended by :

Vice-Principal

and Approved by:

I/C Principal

**SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben
Jivanlal College of Commerce & Economics (AUTONOMOUS)**

DEPARTMENT OF _____

BOARD OF STUDIES – MEETING

Date - _____ 2020

Time: 2:00 PM

Online on MS Teams

AGENDA

- 1)
- 2)
- 3)
- 4)

**SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben
Jivanlal College of Commerce & Economics (AUTONOMOUS)**

RESOLUTION

At the online Board of Studies - _____ meeting held on _____ at _____ on MS Teams, it was resolved that –

- 1)
- 2)
- 3)
- 4)

S.No.	BOS Members	Signature
1	_____ – Chairperson	
2	Two subject experts outside the parent University: a) b)	
3	Vice-Chancellor -University of Mumbai nominee a)	
4	Representative from Industry a)	
5	Post-graduate meritorious alumnus a)	
6	Members of same faculty - a) b)	
7	Member appointed by Management a)	
8	Faculty members a)	

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Jivanlal College of Commerce & Economics (AUTONOMOUS)**

	b)	
	c)	
	d)	

MINUTES OF MEETING

S.No.	Agenda Item	Discussion
1.		
2.		
3.		
4.	Any other matter:	

SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben
Jivanlal College of Commerce & Economics (AUTONOMOUS)



Shri Vile Parle Kelavani Mandal's
**MITHIBAI COLLEGE OF ARTS, CHAUHAN INSTITUTE OF SCIENCE & AMRUTBEN
JIVANLAL COLLEGE OF COMMERCE AND ECONOMICS (AUTONOMOUS)**
*NAAC Reaccredited 'A' grade, CGPA: 3.57 (February 2016),
Granted under RUSA, FIST-DST & -Star College Scheme of DBT, Government of India,
Best College (2016-17), University of Mumbai*

Affiliated to the
UNIVERSITY OF MUMBAI

Program: B.Sc.

Course: USMAACZO6

Semester VI

**Choice Based Credit System (CBCS) with effect from the
Academic year 2018-19**

PROGRAMME SPECIFIC OUTCOMES (PSO'S)

On completion of the B.Sc.- Zoology, the learners should be enriched with knowledge and be able to-

- PSO1:** _____
- PSO2:** _____
- PSO3:** _____
- PSO4:** _____
- PSO5:** _____
- PSO6:** _____
- PSO7:** _____
- PSO8:** _____

Preamble

Evaluation Pattern

The performance of the learner will be evaluated in two components. The first component will be a Continuous Assessment with a weightage of 25% of total marks per course. The second component will be a Semester end Examination with a weightage of 75% of the total marks per course. The allocation of marks for the Continuous Assessment and Semester end Examinations is as shown below:

a) Details of Continuous Assessment (CA)

25% of the total marks per course:

Continuous Assessment	Details	Marks
Component 1 (CA-1)	Test /Assignment/Tutorial/ Visit/Project/ Presentation	15 marks
Component 2 (CA-2)	Test /Assignment/Tutorial/ Visit/Project/ Presentation	10 marks

b) Details of Semester End Examination

75% of the total marks per course. Duration of examination will be two and half hours.

Question Number	Description	Marks	Total Marks
Total Marks			75

Signature

Signature

Signature

HOD

Approved by Vice –Principal

Approved by Principal

**SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben
Jivanlal College of Commerce & Economics (AUTONOMOUS)**

Program: B.Sc. (2021-22)				Semester: VI	
Course: MARINE RESOURCES, POST-HARVEST AND FARM ENGINEERING				Course Code: USMAACZO6	
Teaching Scheme			Evaluation Scheme		
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Continuous Assessment (CA) (Marks - 25)	Semester End Examinations (SEE) (Marks- 75 in Question Paper)
4	4	---	2+2=4	25	75
Learning Objectives:					
<ul style="list-style-type: none"> • To study, acquaint and discover the growing market for fish nutrition • To acquire knowledge of the various aspects of diseases affecting fishes • To acquire knowledge about farm engineering and novel fish culture practices • To teach any one of the units prescribed in the syllabus with more details and in-depth knowledge leading to specialization in the capsule of units selected. • To incorporate the topics of special need of the area which are otherwise not covered in the syllabus. • To give scope to creativity and wisdom of a teacher who wants to deal with the latest developments in the subject without waiting for the university to revise the syllabus. 					
Course Outcomes:					
After completion of the course, learners would be able to:					
<ul style="list-style-type: none"> • Get acquainted with basics of nutritional requirements at various developmental stages of fish and crustaceans • Be oriented towards understanding causes, pathogenicity, prophylaxis and preventive measures of various fish diseases and physiological disorders • Understand the selection process of hatchery sites and various types of designs and construction of aquaculture farm practices • Comprehend the uses of equipment and accessories involved in aquaculture farms 					
Outline of Syllabus: (per session plan)					
Module	Description				No of Hours
1	<p><u>Nutrition</u> 1.1 Nutritional requirements at various stages of development of fish and crustaceans 1.2 Culture of natural feed: i) <i>Chaetoceros</i> ii) <i>Infusoria</i> iii) <i>Artemia</i> iv) <i>Brachionus</i> <i>Daphnia / Moina spp.</i></p> <p>1.3 Algology – Identification and culture of commercially important nutritious algae and its products 1.4 Formulated / Pelleted feed – Understanding the composition and use of formulated feed for fish and prawns / shrimps at various stages</p>				15

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2	<p><u>Diseases</u></p> <p>2.1 Viral diseases, prophylaxis and preventive measures 2.2 Bacterial, fungal, protozoan infections and treatment 2.3 Crustacean infections and treatment 2.4 Physiological disorders (Dropsy) / diseases and treatment</p>	15
3	<p><u>Farm engineering</u></p> <p>3.1 Site selection, designing and construction of hatchery and farms for extensive, semi-intensive and intensive freshwater / brackish-water aquaculture</p> <p>3.2 i) Raft culture ii) Rope culture iii) Pen culture iv) Cage culture with special reference to <i>Rachycentron canadum</i> (Cobia)</p> <p>3.3 Equipment and accessories used in various aqua farms</p>	15
4	<p><u>Open Unit</u></p> <p>Open unit is one of the eight units which may or may not be opted by the college. Teachers in consultation with the students shall define syllabus under this unit every year, if required, and shall seek endorsement of the Head and the Principal. Colleges/institutes have to select the topics as per their needs and available resources. It is pertinent to note that the open unit shall be operational and available in the syllabus only till it comes under the scope of internal assessment.</p>	15
	Total	60
<p>PRACTICALS</p> <p>1) Identification of marine fishes.</p> <ul style="list-style-type: none"> • <i>Stromateus cinereus</i> (Silver pomfret) • <i>Stromateus niger</i> (Black pomfret) • <i>Polynemus tetradactylus</i> (Threadfin) • <i>Pseudosciaena diacanthus</i> (Two-spinned jewfish or Ghol) • <i>Trichiurus haumela</i> (Ribbon fish) • <i>Synagris japonicus</i> (Blackmouth splitfin) • <i>Scomber microlepidotus</i> (Mackerel) • <i>Cybium guttatum</i> (Seerfish or Surmai) • <i>Sardinella longiceps</i> (Indian Oil Sardine) • <i>Thunnus alalunga</i> (Longfin tuna) <p>2) Identification of Crustaceans and Molluscs.</p> <ul style="list-style-type: none"> • <i>Penaeus monodon</i> (Giant Tiger Prawn) • <i>Metapenaeus affinis</i> (Jinga shrimp) • <i>Parapenaeopsis stylifera</i> (Kiddi shrimp) • <i>Acetes indicus</i> (Jawala paste shrimp) • <i>Panulirus polyphagus</i> (Mud spiny lobster) • <i>Scylla serrata</i> (Giant mud crab) • <i>Crassostrea spp.</i> (Oyster) • <i>Sepia pharaonis</i> (Pharaoh cuttlefish) • <i>Loligo duvaucelii</i> (Indian squid) 		

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- 3) Preparation of formulated feed for fish and prawn.
- 4) Identification of parasitic infections in aquatic organisms.
 - Fungal – Dermatomycosis
 - Bacterial – Fin/Tail rot and Dropsy
 - Protozoan – Costiasis and White Spot
 - Crustacean – Argulosis
- 5) Fish dressing, filleting, prawn peeling – PUD, DV and grading.
- 6) Fish morphometry – Length weight relationship of a suitable fish.
- 7) Preparation of Surimi, Fish protein concentrate.
- 8) Preparations of fish burger, fish fingers, fish/prawn pickle, fish chutney, fish curry.
- 9) Preparation of Chitin – Chitosan, Pearl essence.
- 10) Identification of various farm equipment such as:
 - Feeding cups / Trays
 - Paddle wheel aerator
 - Fountains
 - Sluice gate models
 - Elbow pipe outlets
- 11) Study of models of raft, pen, cage culture and materials used in rope culture.
- 12) Project – Feasibility / Scientific.
- 13) Field Visit Report.

Please refer the Annexure II for the suggested field visits and Annexure – III for suggested topics for projects for Course code USACFBIO6P1.

***Note – The practicals may be conducted by using specimens authorized by the wild life and such other regulating authorities though it is strongly recommended that the same should be taught by using photographs/audio-visual aids/simulations/ models etc. as recommended by the UGC and as envisaged in the regulation of the relevant monitoring bodies. No new specimens, however, shall be procured for the purpose of conducting practical mentioned here-in above.**

N.B:

- I) It is pertinent to note that we have to adhere strictly to the directions as given in the UGC Circular F14-4/2006 (CPP-II).
- II) Apart from the Institutional Animal Ethics Committee (IAEC) and any other Committee appointed by a Competent Authority / Body from time to time, every college should constitute the following Committees:
 - 1) A Committee for the Purpose of Care and Supervision of Experimental Animals (CPCSEA) and
 - 2) A Dissection Monitoring Committee (DMC) to ensure that no dissections or mountings are done using animals.

**SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben
Jivanlal College of Commerce & Economics (AUTONOMOUS)**

Unit	Topic	No. of Hours/Credits
Module 1	Nutrition	15
Module 2	Diseases	15
Module 3	Farm Engineering	15
Module 4	Open Unit	15

Composition of DMC shall be as follows:

- i) Head of the Concerned Department (Convener / Chairperson)
- ii) Two Senior Faculty Members of the concerned Department
- iii) One Faculty of related department from the same College
- iv) One or two members of related department from neighbouring colleges.

USE OF ANIMALS FOR ANY EXPERIMENT /DISSECTION /MOUNTING IS BANNED. SIMULATIONS, AUTHORIZED PERMANENT SPECIMENS/SLIDES, CHARTS, MODELS AND OTHER INNOVATIVE METHODS ARE ENCOURAGED.

To develop scientific temper and interest by exposure through industrial visits and study/educational tours is recommended in each semester

PRACTICAL

Unit	Topic	No. of Hours/Credits
	Zoology Practical-AC	2 credits

**SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben
Jivanlal College of Commerce & Economics (AUTONOMOUS)**

Suggested Readings

1. A Text Book of Marine Ecology by Nair M.B. and Thumphy D.H. – Tata MacGraw Hill Pub. – New Delhi.
 2. An Introduction to Fishes by Khanna S.S. – Central Book Depot, Allahabad (1993).
 3. Aquaculture, Principles and Practices by Pillay T.V.R. – Fishing News Books (1988).
 4. Course Manual in Fishing Technology by Latha Shenoy, CIFE, Versova, Mumbai.
 5. Crafts and Gear of India by Y. Shrikrishnan and Latha Shenoy – ICAR Pub.
 6. Ecological Methods for Field and Laboratory Investigations by P. Michael. The Oceans By Svedrup H.V. – et.al. - Asian Pub. House.
 7. Financial management by Prasanna Chandra- Seventh Edition.
 8. Financial management by Khan and Jain.
 9. Financial management by I. M. Pandey.
 10. Fish Biology by C.B.C. Srivastava – Narendra Pub. House.
 11. Fish and Fisheries by Chandy – National Book Trust.
 12. Fish and Fisheries in India – by Jhingran V.G. – Hindustan Pub. Corporation – New Delhi.
 13. Fisheries Biology, Assessment and Management by Michael King – Fishing News Publishers (1995).
 14. Fishery Science by Samtharam R. – Daya Pub. House – 1990.
 15. Fisheries Bioeconomics – Theory, Modelling and Management – FAO Fisheries Technical Paper 368 – FAO, 2001.
 16. General and Applied Ichthyology by Gupta and Gupta, S Chand Publishers.
 17. Handbook of Fish Biology and Fisheries Edited By J.B. Hart and John Reynold.
 18. Hand Book of Fresh Water Fishes of India by Beaven C.R. – Narendra Pub. House.
 19. Introductory Oceanography by Harold Thurman – Printis Hall Pub. London – 8th Edition.
 20. Marine Ecology by Tait R.B. – Oxford Press.
 21. Marine Fish and Fisheries by Dr. D. V. Bal and K.V. Rao - Tata MacGraw Hill Pub. – New Delhi.
 22. Marketing Management by Philip Kotler.
 23. Modern Fishing Gear Technology by N. Shahul Hameed, Boopendranath – Daya Pub. House – 2000.
 24. Prawn and Prawn Fisheries by Kurian and Sebastian.
 25. Project Management by Prasanna Chandra.
 26. Refrigeration and air conditioning By C. P. Arora published in 1981.
 27. Technology for forming of Pacific White Shrimp *Litopenaeus vannamei* in inland saline soils using ground saline water by Lakra, Reddy and Harikrishna, CIFE and ICAR.
 28. Text Book of Fish Biology and Indian Fisheries by Dr. R. P. Parihar, Central Pub. House, Allahabad.
 29. The Book of Indian Shells by Deepak Apte – Oxford Uni. Press.
 30. Wealth of India – Vol. IV – CSIR Pub.
- For Additional and Latest Information on the topics, various Web Sites can be visited.

**SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben
Jivanlal College of Commerce & Economics (AUTONOMOUS)**

Date: 19th October, 2020

To,
Member Secretary,
Academic Council,
Mithibai College (Autonomous),
Vile Parle- West

Subject: Agenda for Academic Council meeting scheduled on _____

Dear Member Secretary,

Kindly include the following agenda for the meeting of Academic Council scheduled for 27th October, 2020.

(Example- Agenda items to be in brief statements)

- i) To approve the format for submission of agenda, notes thereto and curriculum to Academic council
- ii) To confirm/ approve syllabus for _____
- iii) To confirm/ approve-----

Thanking you,

Yours Sincerely,
Head of _____

Recommended by :

Vice-Principal

and Approved by:

I/C Principal

**SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben
Jivanlal College of Commerce & Economics (AUTONOMOUS)**

DEPARTMENT OF _____

BOARD OF STUDIES – MEETING

Date - _____ 2020

Time: 2:00 PM

Online on MS Teams

AGENDA

- 1)
- 2)
- 3)
- 4)

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RESOLUTION

At the online Board of Studies - _____ meeting held on _____ at _____ on MS Teams, it was resolved that –

- 1)
- 2)
- 3)
- 4)

S.No.	BOS Members	Signature
1	_____ – Chairperson	
2	Two subject experts outside the parent University: a) b)	
3	Vice-Chancellor -University of Mumbai nominee a)	
4	Representative from Industry a)	
5	Post-graduate meritorious alumnus a)	
6	Members of same faculty - a) b)	
7	Member appointed by Management a)	
8	Faculty members a)	

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	b)	
	c)	
	d)	

MINUTES OF MEETING

S.No.	Agenda Item	Discussion
1.		
2.		
3.		
4.	Any other matter:	

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Granted under RUSA, FIST-DST & -Star College Scheme of DBT, Government of India,
Best College (2016-17), University of Mumbai*

Affiliated to the
UNIVERSITY OF MUMBAI

Program: B.Sc.

Course: USMAACZO5

Semester V

**Choice Based Credit System (CBCS) with effect from the
Academic year 2018-19**

PROGRAMME SPECIFIC OUTCOMES (PSO'S)

On completion of the B.Sc.- Zoology, the learners should be enriched with knowledge and be able to-

- PSO1:** _____
- PSO2:** _____
- PSO3:** _____
- PSO4:** _____
- PSO5:** _____
- PSO6:** _____
- PSO7:** _____
- PSO8:** _____

Preamble

Evaluation Pattern

The performance of the learner will be evaluated in two components. The first component will be a Continuous Assessment with a weightage of 25% of total marks per course. The second component will be a Semester end Examination with a weightage of 75% of the total marks per course. The allocation of marks for the Continuous Assessment and Semester end Examinations is as shown below:

a) Details of Continuous Assessment (CA)

25% of the total marks per course:

Continuous Assessment	Details	Marks
Component 1 (CA-1)	Test /Assignment/Tutorial/ Visit/Project/ Presentation	15 marks
Component 2 (CA-2)	Test /Assignment/Tutorial/ Visit/Project/ Presentation	10 marks

b) Details of Semester End Examination

75% of the total marks per course. Duration of examination will be two and half hours.

Question Number	Description	Marks	Total Marks
Total Marks			75

Signature

HOD

Signature

Approved by Vice –Principal

Signature

Approved by Principal

**SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben
Jivanlal College of Commerce & Economics (AUTONOMOUS)**

Program: B.Sc. (2021-22)				Semester: V	
Course: OCEANOGRAPHY AND AQUACULTURE PRACTICES				Course Code: USMAACZO5	
Teaching Scheme			Evaluation Scheme		
Lecture (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Continuous Assessment (CA) (Marks - 25)	Semester End Examinations (SEE) (Marks- 75 in Question Paper)
4	4	---	2+2=4	25	75
Learning Objectives:					
<ul style="list-style-type: none"> • To study different instruments and equipment in navigation and oceanography • To introduce physical, chemical and biological oceanography • To study the process of boat building, materials used and various types of diesel engines • To study various types of nets used in fishery • To study and develop skills in breeding techniques, hatchery, nursery and management of various carps • To study and explore various techniques used in fishery and poly culture practices • To develop skills and understanding of breeding and rearing of sewage-fed fishery, Basa cat fish and Tilapia by novel ways 					
Course Outcomes:					
After completion of the course, learners would be able to:					
CO1: Understand and learn about the use of sea safety, navigational equipment and oceanographic instruments					
CO2: Understand basic physical, chemical and biological oceanography					
CO3: Comprehend boat building techniques and design of engines used in mechanized boats					
CO4: Understand the operations of various types of nets and fishing method					
CO5: Understand breeding techniques and skills for culture of major carps					
CO6: Comprehend hatchery and nursery management of major carps					
CO7: Be equipped to carry out entrepreneurial operations or gain confidence to work in freshwater prawn unit					
CO8: Gain knowledge about how to breed and rear ornamental fishes and commercially viable fish species					
Outline of Syllabus: (per session plan)					
Module	Description				No of Hours
1	<u>Oceanography</u> 1.1 Navigational and sea safety equipments i) Life saving devices ii) Global Positioning System (GPS) iii) Rudder iv) Signalling devices 1.2 Oceanographic Instruments i) Niskin water sampler ii) Peterson's grab iii) Dredges iv) Fish finding instruments / Methods v) Remote sensing 1.3 Introduction to basic physical, chemical and biological oceanography				15

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2	<p><u>Crafts and Gear</u></p> <p>2.1 Basic boat building (parts, design, material used), methods of protection from foulers and borers</p> <p>2.2 Basic studies of marine engines:</p> <ol style="list-style-type: none"> i) Outboard and Inboard Engines ii) Sectional View of 2-stroke and 4-stroke Diesel engines iii) Winch and Deck Side Equipment <p>2.3 Operations:</p> <ol style="list-style-type: none"> i) Gill, Trawl, Purse seine Nets ii) Hooks and Lines iii) Non-conventional Fishing Methods such as <ul style="list-style-type: none"> • Light Fishing • Hose Pipe Fishing <ul style="list-style-type: none"> • Electric Fishing 	15
3	<p><u>Farming of Major Carps</u></p> <p>3.1 Breeding techniques of major carps and common carp</p> <p>3.2 Hatchery and nursery management of:</p> <ul style="list-style-type: none"> • Major carps: <ol style="list-style-type: none"> i) IMCs: <i>Labeo rohita</i> (Rohu), <i>Catla catla</i> (Catla), <i>Cirrhinus mrigala</i> (Mrigal) ii) Exotic carps: <i>Hypophthalmichthys molitrix</i> (Silver carp), <i>Ctenopharyngodon idella</i> (Grass carp) iii) <i>Cyprinus carpio</i> (Common carp) <p>3.3 Mono-culture and polyculture practices:</p> <ol style="list-style-type: none"> i) Extensive ii) Semi-intensive iii) Intensive 	15
4	<p><u>Introduction to other Commercial Aquaculture Practices in Fresh Water</u></p> <p>4.1 <i>Macrobrachium rosenbergii</i> (Freshwater prawn)</p> <ol style="list-style-type: none"> i) Breeding, life cycle, hatchery management ii) Monoculture of <i>Macrobrachium rosenbergii</i> iii) Composite culture of major carps and <i>Macrobrachium rosenbergii</i> <p>4.2 Ornamental fishes – breeding and rearing:</p> <p>i) Egg layers:</p> <ul style="list-style-type: none"> • <i>Danio spp.</i> (Danio) • <i>Pterophyllum spp.</i> (Angel) • <i>Symphysodon spp.</i> (Discus) • <i>Paracheiroduon innesi</i> (Neon tetra) • Flower horn (Hybrid variety) • <i>Betta splendens</i> (Siamese fighter) ii) Live bearers: • <i>Poecilia reticulata</i> (Guppy) • <i>Xiphophorus hellerii</i> (Swordtail) • <i>Poecilia velifera</i> (Tangerine) • <i>Poecilia sphenops</i> (Molly) • <i>Xiphophorus maculatus</i> (Platy) 	15
	Total	60

PRACTICALS

- 1) Identification and functioning of oceanographic instruments:
 - Niskin water sampler
 - Peterson's Grab
 - Dredge

- 2) Layout of fishing vessels and sectional view of 2 stroke and 4 stroke diesel engines, lifesaving equipment, winch and deck side equipment.

- 3) Identification of various stages of development of carps and study of sexual dimorphism in adults. Indian major carps:
 - *Labeo rohita* (Rohu)
 - *Catla catla* (Catla)
 - *Cirrhinus mrigala* (Mrigal) Exotic carps:
 - *Cyprinus carpio* (Common Carp)
 - *Hypophthalmichthys molitrix* (Silver Carp)
 - *Ctenopharyngodon idella* (Grass Carp)

- a) Identification of *Litopenaeus vannamei* (Pacific white shrimp) and *Macrobrachium rosenbergii* (Freshwater prawn) b) Study of sexual dimorphism in adults.

- 5) Identification of fishes:
 - *Anabas testudineus* (Climbing perch)
 - *Clarius batrachus* (Walking catfish) • *Boleophthalmus spp.* (Mudskipper)
 - *Pangasianodon hypophthalmus* (Iridescent shark)
 - *Pangasius bocourti* (Basa catfish)
 - *Tilapia* (GIFT)

- 6) Identification of:
 - A) Ornamental fishes:
 - *Pterophyllum spp.* (Angel)
 - *Xiphophorus hellerii* (Swordtail)
 - *Paracheirodon innesi* (Neon tetra)
 - *Betta splendens* (Siamese fighter)
 - *Danio spp.* (Danio)
 - *Symphysodon spp.* (Discus)
 - Flower Horn (Hybrid variety) B) Aquatic plants:
 - Ludwigia
 - Cabomba
 - Corkscrew *Vallisneria*
 - Aquarose
 - Amazon Sword plant C) Aquarium accessories:
 - Aerator
 - Under Gravel Filter
 - Internal Filter
 - External / Canister Filter
 - Food dispensers

- 7) Study of models and functioning of D 81 hatchery, Shirgur's hatcheries and Chinese hatchery.

- 8) Microbial studies:
 - i. Dilution of sample
 - ii. Gram staining technique
 - iii. Identification of Bacilli, Cocci, Vibrio bacteria
- 9) Organoleptic tests for fish and prawn / shrimp
- 10) Total Plate Count (TPC) of bacteria from fish.
- 11) Identification of packaging materials:
 - Waxed duplex carton
 - Master carton
 - Simple cans
 - Coated [Lacquered] cans
 - Polyolefin
 - Retort
- 12) Estimation of toxins and moulting retardant
 - H₂S (qualitative)
 - Ammonia (qualitative)
 - Ca (quantitative)
 - Mg (quantitative)
- 13) Photographic documentation of fishery biology related topics.
Submission of 5 hard and soft copies of 5 original photographs taken by the learner (exif details required).
- 14) Assignment (may be submitted in a group not exceeding three students)

Please refer the Annexure I for the suggested topics for assignment for Course code USACFBIO5P1.

***Note – The practicals may be conducted by using specimens authorized by the wild life and such other regulating authorities though it is strongly recommended that the same should be taught by using photographs/audio-visual aids/simulations/ models etc. as recommended by the UGC and as envisaged in the regulation of the relevant monitoring bodies. No new specimens, however, shall be procured for the purpose of conducting practicals mentioned here-in above.**

N.B:

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Unit	Topic	No. of Hours/Credits
Module 1	Oceanography	15
Module 2	Crafts and Gear	15
Module 3	Farming of Major Carps	15
Module 4	Introduction to other Commercial Aquaculture Practices in Fresh Water	15

Composition of DMC shall be as follows:

- i) Head of the Concerned Department (Convener / Chairperson)
- ii) Two Senior Faculty Members of the concerned Department
- iii) One Faculty of related department from the same College
- iv) One or two members of related department from neighbouring colleges.

USE OF ANIMALS FOR ANY EXPERIMENT /DISSECTION /MOUNTING IS BANNED. SIMULATIONS, AUTHORIZED PERMANENT SPECIMENS/SLIDES, CHARTS, MODELS AND OTHER INNOVATIVE METHODS ARE ENCOURAGED.

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PRACTICAL

Unit	Topic	No. of Hours/Credits
	Zoology Practical-AC	2 credits

**SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben
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Suggested Readings

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 10. Fish Biology by C.B.C. Srivastava – Narendra Pub. House.
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 12. Fish and Fisheries in India – by Jhingran V.G. – Hindustan Pub. Corporation – New Delhi.
 13. Fisheries Biology, Assessment and Management by Michael King – Fishing News Publishers (1995).
 14. Fishery Science by Samtharam R. – Daya Pub. House – 1990.
 15. Fisheries Bioeconomics – Theory, Modelling and Management – FAO Fisheries Technical Paper 368 – FAO, 2001.
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 18. Hand Book of Fresh Water Fishes of India by Beaven C.R. – Narendra Pub. House.
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 21. Marine Fish and Fisheries by Dr. D. V. Bal and K.V. Rao - Tata MacGraw Hill Pub. – New Delhi.
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 23. Modern Fishing Gear Technology by N. Shahul Hameed, Boopendranath – Daya Pub. House – 2000.
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 28. Text Book of Fish Biology and Indian Fisheries by Dr. R. P. Parihar, Central Pub. House, Allahabad.
 29. The Book of Indian Shells by Deepak Apte – Oxford Uni. Press.
 30. Wealth of India – Vol. IV – CSIR Pub.
- For Additional and Latest Information on the topics, various Web Sites can be visited.

**SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben
Jivanlal College of Commerce & Economics (AUTONOMOUS)**

Date: 19th October, 2020

To,
Member Secretary,
Academic Council,
Mithibai College (Autonomous),
Vile Parle- West

Subject: Agenda for Academic Council meeting scheduled on _____

Dear Member Secretary,

Kindly include the following agenda for the meeting of Academic Council scheduled for 27th October, 2020.

(Example- Agenda items to be in brief statements)

- i) To approve the format for submission of agenda, notes thereto and curriculum to Academic council
- ii) To confirm/ approve syllabus for _____
- iii) To confirm/ approve-----

Thanking you,

Yours Sincerely,
Head of _____

Recommended by :

Vice-Principal

and Approved by:

I/C Principal

DEPARTMENT OF _____

BOARD OF STUDIES – MEETING

Date - _____ 2020

Time: 2:00 PM

Online on MS Teams

AGENDA

- 1)
- 2)
- 3)
- 4)

**SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben
Jivanlal College of Commerce & Economics (AUTONOMOUS)**

RESOLUTION

At the online Board of Studies - _____ meeting held on _____ at _____ on MS Teams, it was resolved that –

- 1)
- 2)
- 3)
- 4)

S.No.	BOS Members	Signature
1	_____ – Chairperson	
2	Two subject experts outside the parent University: a) b)	
3	Vice-Chancellor -University of Mumbai nominee a)	
4	Representative from Industry a)	
5	Post-graduate meritorious alumnus a)	
6	Members of same faculty - a) b)	
7	Member appointed by Management a)	
8	Faculty members a)	

**SVKM's Mithibai College of Arts, Chauhan Institute of Science & Amrutben
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	b)	
	c)	
	d)	

MINUTES OF MEETING

S.No.	Agenda Item	Discussion
1.		
2.		
3.		
4.	Any other matter:	