FACULTY OF LIFE SCIENCES

Syllabus for

Bachelor of Science (Medical)

(SEMESTER: I-II)

(Under Credit Based Continuous Evaluation Grading System)

Session: 2023-24

Kanya Maha Vidyalaya, Jalandhar (Autonomous)

The Heritage Institution

KANYA MAHAVIDYALAYA, JALANDHAR (AUTONOMOUS)

SCHEME AND CURRICULUM OF EXAMINATIONS OF THREE YEAR DEGREE PROGRAM

Session-2023-24

Bachelor of Science (Medical) Semester -I										
Course Name	**Program Name**	**Course Code**	**Course Type**	**Total Marks**	**Marks**					
					Paper	**Credits**	**Ext.**		**CA**	**EXAM TIME In Hrs**
						L-T-P	**L**	**P**		
Zoology	Bachelor of Science (Medical)	BSMM-1483 (I)	C	**50**	**Cell Biology**	**2-0-0**	**40**		**10**	**3**
		BSMM- 1483 (II)		**75**	**Biodiversity- I**	**3-0-0**	**60**		**15**	**3**
		BSMM- 1483 (P)		**50**	**Practical -I (Related to Cell Biology and Biodiversity- I)**	**0-0-2**		**40**	**10**	**3**
Bachelor of Science (Medical) Semester -II										
Zoology	Bachelor of Science (Medical)	BSMM-2483 (I)	C	**50**	**Ecology**	**2-0-0**	**40**		**10**	**3**
		BSMM- 2483 (II)		**75**	**Biodiversity- II**	**3-0-0**	**60**		**15**	**3**
		BSMM- 2483 (P)		**50**	**Practical -II (Related to Ecology and Biodiversity- II)**	**0-0-2**		**40**	**10**	**3**

Bachelor of Science (Medical) Semester–I(Session 2023-24)
ZOOLOGY
(CELL BIOLOGY)
Course Code: BSMM-1483 (I)
(THEORY)

Course Outcome

After passing this course the student will be able to:

- CO1. Perform a variety of molecular and cellular biology techniques
- CO2. Describe cellular membrane structure and function, fine structure and function of cell organelles.
- CO3.Gain knowledge about structure and function of cell organelles.
- CO4. Learn elementary idea about Cancer and Immunity.

Bachelor of Science (Medical) Semester–I(Session 2023-24)

ZOOLOGY

(CELL BIOLOGY)

Course Code: BSMM-1483 (I)

(THEORY)

Credits: 2-0-0 **Marks: 40**

Time: 3 Hours **Pass Marks: 14**

Instructions for the Paper Setter

Eight questions of equal marks (8 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

UNIT-I

Methods in Cell Biology

(a) Principles of light and phase contrast microscopy
(b) Electron microscopy (TEM and SEM)
(c) Fixation and fixatives
(d) Staining techniques.

UNIT-II

Organization of Cell: Extra nuclear and nuclear, ultrastructure and functions of cell organelles

(a) Plasma Membrane: Structure, osmosis, active and passive transport, endocytosis and exocytosis.
(b) Endoplasmic reticulum: Structure, types and associated enzymes.
(c) Mitochondria: Structure, mitochondrial enzymes and role of mitochondria in respiration and mitochondrial DNA.

UNIT-III

Organization of Cell:

(a) Golgi complex: Structure and functions.
(b) Ribosomes: Types of ribosomes, their structure and functions.
(c) Lysosomes: Polymorphism and their function.
(d) Centrosome: Structure and functions.

UNIT-IV

Nucleus: Structure and functions of nuclear membrane, nucleolus and chromosomes.

An elementary idea of cell transformation in cancer

An elementary idea of cellular basis of immunity

Suggested Readings:

1. Cooper, G. M. (2004), The cell, A Molecular Approach, ASM press, Washington, D. C.
2. Karp, G. (1984). Cell Biology (4^{th} ed), McGraw Hill, New York.
3. Pawar, C.B (1999), Cell Biology, Himalaya Publishing House, Bombay.
4. Dhami P. K. (2000) Zoology I, Pradeep Publishers.

Bachelor of Science (Medical) Semester–I(Session 2023-24)
ZOOLOGY
(BIODIVERSITY- I
(PROTOZOA TO ANNELIDA))
Course Code: BSMM-1483 (II)
(THEORY)

Course Outcome

After passing this course the student will be able to:

- CO1:Gain knowledge about physiology of unicellular life and parasitic protozoan.
- CO2:Understand the important marine water non chordates.
- CO3:Learn about parasitic Platyhelminthes
- CO4: Understand the economic importance and physiology of Ascaris and earthworm

Bachelor of Science (Medical) Semester–I(Session 2023-24)
ZOOLOGY
(BIODIVERSITY- I
(PROTOZOA TO ANNELIDA))
Course Code: BSMM-1483 (II)
(THEORY)

Credits: 3-0-0 **Marks: 60**
Time: 3 Hours **Pass Marks: 21**

Instructions for the Paper Setter

Eight questions of equal marks (12 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

Detailed Type study of the following animals

UNIT-I

Protozoa: *Amoeba proteus,*

Paramecium caudatum (with special reference to Kappa particles in *P. aurelia*)

Plasmodium vivax.

UNIT-II

Parazoa (Porifera): *Sycon*,

Cnidaria (Coelentrata): *Obelia*

UNIT-III

Platyhelminthes: *Fasciola hepatica,*

Taenia solium

Larvae of *Fasciola hepatica* and *Taenia solium*

UNIT-IV

Aschelminthes: *Ascaris,* Parasitic adaptations in Helminthes

Annelida: *Pheretimaposthuma*(Earthworm)

Suggested Readings:

1. Dhami, P.S. &Dhami, J. K(2001), Invertebrates, R. Chand & Co., New Delhi.
2. Brusca, R. C. and Brusca, G. J. (2003), Invertebrates (2nd ed). Sinauer Associates, Inc. Publishers, Sunderland, Massachusetts.

3. Engemann, J. G. and Hegner, R. W. (1981), Invertebrate Zoology (3rd ed.) Macmillan, New York.
4. Gardiner, M. S. (1972), The Biology of Invertebrates, McGraw Hill, New York.
5. Meglitsch, P. A. and Schran, F. R. (1991), Invertebrate Zoology (3^{rd} ed). Oxford University Press, New York.
6. Pechenik, A. Jan. (2000), Biology of the invertebrates, (4^{th} ed), McGraw Hill Book Co. Singapore.

Bachelor of Science (Medical) Semester–I(Session 2023-24)
ZOOLOGY
(PRACTICAL-I (RELATED TO CELL BIOLOGY & BIODIVERSITY-I))
Course Code: BSMM-1483 (P)
(PRACTICAL)

Course Outcome

After passing this course the student will be able to:

- CO1. Familiarise with Scientific method
- CO2.Recognise the importance of conservation
- CO3. Observe chromosomal arrangements during cell division
- CO4. Understand role of invertebrates

Bachelor of Science (Medical) Semester–I(Session 2023-24)
ZOOLOGY
(PRACTICAL-I (RELATED TO CELL BIOLOGY & BIODIVERSITY-I))
Course Code: BSMM-1483 (P)
(PRACTICAL)

Credits: 0-0-2 **Marks: 40**
Time: 3 Hours **Pass Marks: 14**

Instructions for the Practical Examiners: Question paper is to set on the spot jointly by the Internal and External Examiners. Two copies of the same should be submitted for the record to COE Office, KanyaMaha Vidyalaya, Jalandhar

Guidelines for conduct of practical Examination: -

1. Identify and classify the specimens upto order level. Write a note on their habit, habitat, special features and economic importance. 8
2. Identify the slides/micrographs and give two reasons for identification. 8
3. Make a temporary mount of protozoa. 4
4. Draw a well labelled sketch of the given system of the organism and explain to the examiner. 6
5. Write down the theory and procedure of gel electrophoresis/ paper chromotogaphy/thin layer chromatography/ SEM & TEM. 4
6. Report 4
7. Viva-voce & Practical file. 6

1. Classification up to order level with ecological notes and economic importance (if any) of the following animals (Through Specimens or slides):

A. Protozoa: *Amoeba, Euglena, Trypanosoma, Noctiluca, Eimeria, Monocystis, Paramecium Opalina, Vorticella, Balantidium, Nyctotherus*and *Polystomella.*

B. Porifera: *Sycon, Grantia, Euplectella, Hyalonema, Spongilla, Euspongia.*

C. Cnidaria:*Porpita, Velella, Physalia, Aurelia, Rhizostoma, Metridium, Millipora, Alcyonium, Tubipora, Zoanthus, Madrepora, Favia, Fungia and Astrangia.*

Hydra (W.M.), *Hydra* with buds, *Obelia* (colony and medusa), *Sertularia, Plumularia, Tubularia, Bougainvillea* and *Aurelia*

D. Platyhelminthes: *Dugesia, Fasciola, Taenia, Echinococcus.*

Miracidium, Sporocyst, Redia, Cercaria of *Fasciola,* scolex and proglottids of *Taenia* (mature and gravid).

E. Aschelminthes: *Ascaris*(male and female), *Trichinella, Ancylostoma.*

F. Annelida:*Pheretima, Nereis, Heteronereis, Polynoe, Eunice, Aphrodite, Chaetopterus, Arenicola, Tubifex* and *Pontobdela*

2. **Study of the following permanent stained preparations**:

A. L.S. and T.S. *Sycon,* gemmules, spicules and spongin fibers of a sponge.

B. T.S. *Hydra* (Testis and ovary region)

C. T.S. *Fasciola*(Different regions)

D. T.S. *Ascaris* (Male and Female)

E. T.S. *Pheretima*(pharyngeal and typhlosolar regions), Setae, septal nephridia, spermathecae and ovary of *Pheretima*(Earthworm).

3. **Preparation of the following slides**:

Temporary permanent preparation of freshwater Protozoan culture.

4. **Demonstration of** digestive, reproductive and nervous systems of earthworm with the help of charts/videos/models.

5. **Cell Biology:**

A. Paper chromatography.
B. Gel electrophoresis through photographs or through research laboratories
C. Familiarity with TEM & SEM.
D. Study of different ultra-structures of cell organelles through photographs.

6. Visit to a vermi–composting unit and submission of report.

Note:- Some changes can be made in the practical depending on the availability of material.

Bachelor of Science (Medical) Semester–II(Session 2023-24)
ZOOLOGY
(ECOLOGY)
Course Code: BSMM-2483 (I)
(THEORY)

Course Outcomes

After passing this course the student will be able to:

- CO1. Describe the history, introduction and nature of ecosystem
- CO2. Understand the biogeocycles and ecological adaptations.
- CO3. Know about the characteristics of population & biotic community.
- CO4. Know about the conservation of resources.

Bachelor of Science (Medical) Semester–II(Session 2023-24)
ZOOLOGY
(ECOLOGY)
Course Code: BSMM-2483 (I)
(THEORY)

Credits: 2-0-0 **Marks: 40**
Time: 3 Hours **Pass Marks: 14**

Instructions for the Paper Setter

Eight questions of equal marks (8 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

UNIT-I

Ecology: Definition, Subdivisions and scope of ecology.

Ecosystem: Components, ecological energetics, food web, major ecosystems of the world.

Ecological factors: Temperature, light and soil as ecological factors.

UNIT-II

Nutrients: Biogeochemical cycles and concept of limiting factors.

Ecological Adaptations: Morphological, physiological and behavioural adaptations in animals in different habitats.

UNIT-III

Population: Characteristics and regulations of population. Inter and Intra Specific relationship: Competition, Predation, Parasitism, Commensalism and Mutualism.

Biotic community: Characteristics, ecological succession, ecological niche.

UNIT-IV

Natural resources: Renewable and nonrenewable natural resources and their conservations.

Environmental Issues: Causes, impact and control of environmental pollution.

Suggested Readings:

Anderwartha, H.G. and Birch, L. C. (1970), The distribution and abundance of animals, University of Chicago Press, Chicago London.

Beeby, A. (1992), Applying Ecology, Chapman and Hall Madras.

Begon, M., Harper J. L. and Townsend, C. R. (1995), Ecology – Individuals, populations and communities, Blackwell Science, Cambridge UK.

Brewer, R. (1994), The science of Ecology, Saunders College of Publishing, New York.

Chapman, J. L. and Resis, M. J. (1995), Ecology- Principles and applications, Cambridge University Press, Cambridge UK.

Kaeighs, S. C. (1974), Ecology with special references to animal and Man, Prentice Hall Inc.

Kormondy, E.J. (1975), Concept of Ecology, Englewood Cliffs, N.J. Prentice Hall Inc.

Kreb C.J. (1982), Ecology, Harper & Row, New York.

Putmann, R. J. and Wratten, S. D. (1984), Principles of Ecology, Crown Helm, London.

Bachelor of Science (Medical) Semester–II(Session 2023-24)
ZOOLOGY
(BIODIVERSITY- II
(ARTHROPODA TO HEMICHAORDATA))
Course Code: BSMM-2483 (II)
(THEORY)

Course Outcomes:

After passing this course the student will be able to:

CO1. Understand physiology and economic importance of cockroach and social organization of insects.

CO2. Gain knowledge about the general pattern of life history of phylum mollusca

CO3. Learn about life history and larval forms of Echinodermata

CO4. Gain knowledge about affinities of Hemichordates with Non-Chordates and Chordates

Bachelor of Science (Medical) Semester–II(Session 2023-24)
ZOOLOGY
(BIODIVERSITY- II
(ARTHROPODA TO HEMICHAORDATA))
Course Code: BSMM-2483 (II)
(THEORY)

Credits: 3-0-0 **Marks: 60**
Time: 3 Hours **Pass Marks: 21**

Instructions for the Paper Setter

Eight questions of equal marks (12 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any Section.

UNIT-I

Arthropoda: Type study-*Periplaneta americana* (Cockroach),

Social organizations in insects (Honey bee and Termite)

UNIT-II

Mollusca: Type study-Pila globosa, Tortion, Pearl formation

UNIT-III

Echinodermata: Type study - Asterias (Star fish), Study of Echinoderm larvae

UNIT-IV

Hemichordata:Type study - Balanoglossus (External characters only).Affinities of Hemichordates with Non-Chordates and Chordates

Suggested Readings:

Barnes, R.D.(1999), Invertebrate Zoology. W.B. Saunder, Philadelphia.

Dhami, P.S. & Dhami, J. K., Invertebrates, R. Chand & Co., New Delhi, 2001.

Barth, R. H. and Broshears, R. E (1982), The Invertebrate world. Holt Saunder, Japan.

Brusca, R. C. and Brusca, G. J. (2003), Invertebrates (2nd ed), Sinauer Associates, Inc. Publishers, Sunderland, Massachusetts.

Engemann, J. G. and Hegner, R. W. (1981), Invertebrate Zoology (3rd ed), Macmillan, New York.

Gardiner, M. S. (1972), The Biology of Invertebrates, McGraw Hill, New York.

Meglitsch, P. A. and Schran, F. R. (1991), Invertebrate Zoology (3rd ed), Oxford University Press, New York.

Pechenik, A. Jan. (2000), Biology of the invertebrates, (4th ed), McGraw Hill Book Co. Singapore.

Bachelor of Science (Medical) Semester–II(Session 2023-24)
ZOOLOGY
(PRACTICAL- II (RELATED TO ECOLOGY AND BIODIVERSITY-II))
Course Code: BSMM-2483 (P)
(PRACTICAL)

Course Outcomes:

After passing this course the student will be able to:

CO1. Know about the morphological, physiological & behavioural adaptations of different animals in different habitats.

CO2. Familiarise with the classification & ecology of invertebrates.

CO3. Identify different zoogeographical realms with fauna.

CO4. Know about the different nest of birds.

Bachelor of Science (Medical) Semester–II(Session 2023-24)
ZOOLOGY
(PRACTICAL- II (RELATED TO ECOLOGY AND BIODIVERSITY-II))
Course Code: BSMM-2483 (P)
(PRACTICAL)

Credits: 0-0-2 **Marks: 40**
Time: 3 Hours **Pass Marks: 14**
Instructions for the Practical Examiners:

Question paper is to set on the spot jointly by the Internal and External Examiners. Two copies of the same should be submitted for the record to COE Office, Kanya Maha Vidyalaya, Jalandhar

1. Classification up to order level with ecological notes and economic importance (if any) of the following animals:

Arthropoda: Peripatus, Palaemon (prawn), Lobster, Cancer (crab), Sacculina, Eupagurus (hermit Crab), Lepas, Balanus, Cyclops, Daphnia, Lepisma, Periplaneta (cockroach), Schistocerca (locust), Poecilocerus (ak grasshopper), Gryllus (cricket), Mantis (praying mantis), Cicada, Forficula (earwig), Dragonfly, Termite queen, Bug, Moth, Beetles, Polistes (wasp), Apis (honey bee), Bombyx, Pediculus (body louse) Millipede and Centipede, Palamnaeus (scorpion), Aranea (spider) and Limulus (king Crab).

Mollusca: Anodonta, Mytilus, Ostrea, Cardium, Pholas, Solen (razor fish), Pecten, Haliotis, Patella, Aplysia, Doris, Limax, Loligo, Sepia, Octopus, Nautilus shell (Complete and T.S.), Chiton, Dentalium.

Echinodermata: Asterias, Echinus Ophiothrix, Antedon.

Hemichordata: Balanoglossus.

2. **Study of the following permanent stained preparations:**

Trachea and mouth parts of Insects

Radula and osphradium of Pila

T.S. Star fish (Arm).

3. **Demonstration of digestive and nervous systems of *Periplaneta* (cockroach) with the help of charts/models/videos.**

4. **Ecology:**

Study of animal adaptations with the help of specimens, charts and models.

Study of abiotic and biotic components of an ecosystem.

Study of different types of nests of birds.

Study and preparation of Zoogeographical charts.

5. **Assignment**

Note:- Some changes can be made in the practicals depending on the availability of material.

Guidelines for conduct of practical Examination:-

1.	Identify and classify the specimens upto order level. Write a note on their habit, habitat, special features and economic importance.	**8**
2.	Draw a well labelled sketch of the given system of the animal & explain it to the examiner.	**6**
3.	Identify the slides/models and give two reasons for identification.	**6**
4.	Identify the adaptive feature/nest.	**4**
5.	Mark the distribution of animals of a realm on the map.	**4**
6.	Assignment	**4**
7.	Viva-voce & Practical file.	**8**